

National Park Service
U.S. Department of the Interior

Cape Lookout National Seashore
North Carolina



CAPE LOOKOUT NATIONAL SEASHORE

INTERIM PROTECTED SPECIES MANAGEMENT PLAN / ENVIRONMENTAL ASSESSMENT

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SUMMARY

Cape Lookout National Seashore was authorized as a unit of the National Park Service on March 10, 1966 but did not gain ownership of the land until 1976. It is located three miles off the mainland coast in the central coastal area of North Carolina and occupies more than 29,000 acres of land and water from Ocracoke Inlet on the northeast to Beaufort Inlet to the southwest (see “Figure 1: Vicinity Map”). The 56 miles of barrier islands consist mostly of wide, bare beaches with low dunes covered by scattered grasses, flat grasslands bordered by dense vegetation, and large expanses of salt marsh alongside the sound.

The purpose of taking action at this time is to evaluate and implement strategies to protect sensitive species and prevent adverse effects to protected species, while allowing for appropriate recreational use as directed in the seashore’s enabling legislation, National Park Service (NPS) management policies, the Endangered Species Act, the Migratory Bird Treaty Act, and other laws and mandates until a long-term off-road vehicle (ORV) management plan is developed. An interim protected species management plan would meet the following needs until the long-term ORV management plan/EIS is completed:

- The need for a guide to management practices for protection of species over the next 3 to 4 years until a long-term ORV management plan and regulations are developed.
- The need for a management plan on which to consult with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.
- The need for a management plan that complies with the Endangered Species Act, the Migratory Bird Treaty Act, NPS management policies, and park enabling legislation, and that avoids adverse effects to protected species.

OBJECTIVES IN TAKING ACTION

Objectives are “what must be achieved to a large degree for the action to be considered a success” (NPS 2001a). All alternatives selected for detailed analysis must meet project objectives to a large degree, and resolve the purpose and need for action. Objectives must be grounded in the park’s enabling legislation, purpose, significance, and mission goals, and be compatible with direction and guidance provided by the park’s general management plan, strategic plan, and/or other management guidance. The following are objectives for developing an interim protected species management plan:

- Management Methodology
 - Formalize adaptive interim management practices and procedures that have the ability to respond to changes in the seashore’s dynamic physical and biological environment.
 - Provide procedures for prompt and efficient public notification of protected species management actions including the reasons for these actions.
 - Continue an ongoing and meaningful dialogue with the multiple publics interested in and affected by protected species management to ensure development of a workable plan.
- Visitor Use and Experience
 - Provide for continued recreational use and access consistent with required management of protected species.

- Increase opportunities for public awareness and understanding of NPS resource management and visitor use policies and responsibilities as they pertain to the seashore and protected species management.
- Threatened, Endangered, and Other Protected Species
 - Provide protection for threatened, endangered, and other protected species (e.g., state-listed species) and their habitats from adverse impacts related to recreational uses as required by state and federal laws and policies.
 - Actively consult and cooperate with the U.S. Fish and Wildlife Service to ensure that NPS management actions comply with the requirements of the Endangered Species Act.
- Park Management and Operations
 - Develop an interim protected species management plan that minimizes impacts to other park operations.

BACKGROUND

The development of an interim protected species management plan at Cape Lookout National Seashore is in part the result of two petitions for rulemaking submitted to the National Park Service, related to ORV use. The first petition was submitted on December 9, 1999, on behalf of the Bluewater Network and 70 environmental organizations. This petition requested an immediate ban on the use of all-terrain vehicles, dune buggies, sand buggies, and other four-wheel drive vehicles on all off-road areas in the national park system. This petition was NPS-wide, and while it included Cape Lookout National Seashore, it was not specific to the seashore. Petitioners stated that current legal off-road use of all-terrain vehicles, dune buggies, sand buggies, and four-wheel drive vehicles in the 23 national park units fails to leave parks “unimpaired for the enjoyment of future generations” (Bluewater Network 1999).

In the petition, Bluewater Network also requested that the NPS recommend to Congress that relevant enabling or other park-specific legislation be amended so the National Park Service may appropriately fulfill its mission and charter in response to the five, out of 23, park units that currently allow for ORV use as a result of inappropriate enabling, or other legislation. Furthermore, the Bluewater Network stated that one 1999 survey of ORV use in the parks found 40 park units with high amounts of illegal use. To address this, the petition requested the NPS issue an advisory to increase the enforcement of the present rules (Bluewater Network 1999).

The second petition was specific to actions occurring at Cape Hatteras National Seashore, located just north of Cape Lookout National Seashore. On June 7, 2004, a Petition for Rulemaking Governing Off-Road Vehicle Use in the Cape Hatteras National Seashore was submitted to the Secretary of the Department of the Interior, the Director of the National Park Service, and the Superintendent of the Outer Banks Group by the National Parks Conservation Association, the Wilderness Society, and the Natural Resources Defense Council, also referred to as the petitioners. This petition requested that the National Park Service promulgate regulations regarding the use of ORVs in the Cape Hatteras National Seashore. The petitioners first state that the informal authorization of ORV use at the seashore violates the federal Endangered Species Act because it does not conserve endangered and threatened species and was implemented without consultation for all affected species with the U.S. Fish and Wildlife Service. Second, the petitioners state that the absence of a formal, promulgated ORV management plan violates Executive Orders and federal regulations regarding ORV use in the National Park System. The third claim states that the informal authorization does not protect the seashore’s natural resources and, consequently,

violates the Organic Act of 1916, the General Authorities Act of 1970, the Cape Hatteras National Seashore enabling legislation, and various NPS management policies (NPCS 2004).

On May 17, 2005, Defenders of Wildlife (Defenders), a non-profit environmental organization, issued a notice of intent to sue the National Park Service for alleged violations of the Endangered Species Act, 16 U.S.C. §§ 1531 et seq., NEPA, 42 U.S.C. §§ 4321 et seq., the Migratory Bird Treaty Act, 16 U.S.C. §§ 703 et seq., the NPS Organic Act, 16 U.S.C. §§ 1601 et seq., and the enabling legislation for Cape Hatteras National Seashore, 50 Stat. 669 (1937). Defenders alleged that the NPS continuing authorization of ORV use at Cape Hatteras National Seashore without first engaging in formal consultation with the U.S. Fish and Wildlife Service “violates the agency’s obligations under the [Endangered Species Act] to carry out programs for the conservation of endangered and threatened species and may be resulting in the take of those species.” Defenders also alleged that the continued authorization of ORV use at the seashore without an assessment of environmental impact violates NEPA and that NPS actions have also caused the death of numerous migratory birds in violation of the Migratory Bird Treaty Act. Although these allegations were directed solely at Cape Hatteras National Seashore, Cape Lookout faces similar concerns.

Finally, on November 29, 2005, Bluewater Network, a division of Friends of the Earth; the National Parks Conservation Association (NPCA); and Wildlands CPR filed a lawsuit against the National Park Service and the Department of Interior in U.S. District Court in Washington, D.C., alleging that those agencies failed in numerous ways to protect the National Park System against the extensive damage caused by all-terrain vehicles and other off-road vehicles in America’s national parks.

These actions and the increased use by the public for recreational purposes necessitates the development of a long-term management plan to address these issues and to meet the requirements for protection of federally listed species under Sections 7(a) (1) and (2) of the Endangered Species Act (ESA). According to the 1988 National Park Service Management Guidelines: “The NPS will survey for, protect, and strive to recover all species native to national park system units that are listed under the ESA. The NPS will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species.” The Endangered Species Act directs federal agencies to carry out programs for the conservation of endangered and threatened species and to ensure that any action authorized, funded, or carried out by an agency is not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat.

Until a long-term ORV management plan/EIS for Cape Lookout National Seashore is complete, the NPS wishes to establish an interim protected species management plan to ensure for the proper management of protected species and comply with the Endangered Species Act, while providing for adequate use of the seashore’s recreational resources. The species addressed in this plan / environmental assessment are those specifically affected by recreational use within the seashore that are listed federally or by the state as threatened, endangered, or species of special concern and/or are of special concern to the park. To implement such a plan, NPS must complete an environmental assessment in accordance with the National Environmental Policy Act. Several alternatives are evaluated in this plan / environmental assessment.

SUMMARY OF PROTECTED SPECIES MANAGEMENT AT CAPE LOOKOUT NATIONAL SEASHORE

Providing a variety of important habitats, Cape Lookout National Seashore plays a vital role in the survival of many wildlife species. Be it for nesting, resting, or feeding, the park provides for a diverse assemblage of birds. Rich, varied habitats and locations along the Atlantic Flyway contribute in attracting

birds to the seashore. In 1999, the American Bird Conservancy designated Cape Lookout National Seashore as a Globally Important Bird Area in recognition of the value the seashore provides to bird migration, breeding, and wintering (American Bird Conservancy 2005). The seashore is home to the federally listed piping plover. In addition, the seashore provides nesting habitat for several species of state-listed colonial waterbirds, including the common tern, least tern, gull-billed tern, and black skimmer. Solitary nesters, such as the American oystercatcher and Wilson's plover also use Cape Lookout National Seashore as a breeding ground as well as the red knot, which uses the seashore as wintering habitat during spring and fall migrations.

Cape Lookout National Seashore is used as nesting habitat by four federally listed sea turtles: the loggerhead, green, leatherback, and Kemp's ridley. One other federally listed sea turtle species, the hawksbill, occupies the surrounding waters.

The federally listed seabeach amaranth, a coastal plant, has also been documented at the seashore.

RECREATION AND PROTECTED SPECIES MANAGEMENT

Not only does Cape Lookout National Seashore provide habitat for a variety of federal and state listed species and sensitive species, it serves as a popular recreation destination, with over 720,000 visitors in 2004. Following its enabling legislation and mission, Cape Lookout National Seashore must find balance in the needs for species protection and visitor use.

On February 8, 1972, President Richard Nixon issued Executive Order 11644 to "establish policies and provide for procedures that will ensure the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands." The Executive Order directs agencies to develop and issue regulations and administrative instructions to provide for administrative designation of the specific areas and trails on public lands on which the use of ORVs may be permitted, and areas in which the use of ORVs may not be permitted.

Executive Order 11989: Off-Road Vehicles on Public Lands, issued on May 24, 1977 by President Jimmy Carter, directs agencies to immediately close off-road areas or trails when it is determined that the use of ORVs will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources to the type of ORV causing such effects, until such time as determined that such adverse effects have been eliminated and measures have been implemented to prevent future recurrence. Also included in the Executive Order is the authority to adopt the policy that portions of the public lands under an agency's jurisdiction shall be closed to use by ORVs except those areas or trails that are suitable and specifically designated as open to such use.

ORVs that come onto the islands via the vehicle-passenger ferries can access beaches without obtaining a permit, 24 hours per day, 365 days per year, excluding areas closed for resource protection or safety reasons. While the number of human visitors to the seashore has increased over time, the breeding population of the federally threatened piping plover and seabeach amaranth has declined along with documented statewide declines for common terns, least terns, gull-billed terns, black skimmers, and American oystercatchers. Recreational pressure has been implicated in low reproductive success and declining population trends for all of these species, as well as for disturbance and/or mortality of migrating and wintering piping plovers, colonial waterbirds, and American oystercatchers. Adults, nests, and hatchlings of the four species of sea turtles that nest at the seashore have also been impacted by recreational use.

The introduction of vehicle-passenger ferries to North Core Banks and South Core Banks facilitated visitor access to the islands and resulted in increased vehicle use on beaches for recreational purposes. Presently at the seashore, ORVs are used for recreational fishing, sightseeing, travel to and from camping areas, and pleasure driving. In 2004, the NPS began preliminary planning for ORV management as required by federal law and regulations. This process will result in a long-term ORV management plan/EIS and a special regulation.

ALTERNATIVES CONSIDERED

This environmental assessment evaluates four alternatives for an interim protected species plan at Cape Lookout National Seashore:

- Alternative A – No-Action Alternative, Continuation of Current Management

Under the no-action alternative, protected species management at the seashore would be a continuation of current management, including uses of ORV closures to protect sensitive species and their habitats

- Alternative B – Increased Buffer Zones and Increased Surveying

Alternative B would be similar to alternative A, except that surveying of species would be increased and buffer areas and the associated ORV or full-recreational closures around bird nests, foraging chicks, and sea turtle nests would be increased. More detailed information would be collected on some species. In addition to the year-round ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit, a full-recreational closure would be implemented for 2 miles along the north end of South Core Banks and seasonal ORV closures at Middle Core Banks and “Ophelia Banks.” Management actions would include some limitations on night driving and a prohibition on pets within the seashore from April 15 through August 31.

In summary, this alternative would provide increased protection from additional ORV closures and full-recreational closures around individual species nests, with some areas closed to ORV from ramp to ramp to protect American oystercatcher chicks when present on the beach. Increased surveying of species would occur; however, there would be no significant changes in enforcement levels, although additional law enforcement personnel would be stationed at the ferry landings 4 days per week to provide information regarding species closures and seashore policies related to species management.

- Alternative C – Adaptive Species Management; Increased Surveying, Enforcement, and Education

Alternative C would provide protection similar to B. In addition to the year-round ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit, an ORV closure would be implemented for 2 miles along the north end of South Core Banks when piping plover nests and/or chicks are present and seasonal ORV closures would be implemented at Middle Core Banks and “Ophelia Banks.” Visitor outreach efforts would be increased, providing law enforcement staff at ferry landings 7 days per week to inform the public of species management activities and related closures. Some areas would be closed from ramp to ramp to all recreation to protect American oystercatcher mating adults and chicks.

- Alternative D – Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)

Alternative D would provide increased species protection through a variety of adaptive management measures, including some ramp-to-ramp closures for American oystercatcher. Some additional surveying would occur above current levels. Visitor outreach efforts would be increased, providing interpretation staff at ferry landings 7 days per week to inform the public of species management activities and related closures.

Based on the environmental analysis prepared for this plan, alternative B is considered the environmentally preferred alternative because it would best fulfill park responsibilities as trustee of this sensitive habitat; ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings; and attain a wider range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences. Alternative D is the seashore's preferred alternative because it best meets the purpose, need, and objectives of the plan.

ENVIRONMENTAL CONSEQUENCES

Impacts of the four interim protected species management alternatives were assessed in accordance with *Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-Making* (NPS 2001a). The *Director's Order #12 Handbook* requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

To determine impacts, methodologies were identified to assess the impacts that would occur with the implementation of the management alternatives. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions, both adverse and beneficial.

Each management alternative was compared to a baseline to determine the context, duration, and intensity of resource impacts. The baseline, for purposes of impact analysis, is the continuation of current management (alternative A). Table A summarizes the results of the impact analysis for the impact topics that were assessed in the "Environmental Consequences" chapter.

No park resources or values would be impaired by implementing any of the alternatives considered.

TABLE A: SUMMARY OF IMPACTS

Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Federally Listed Special Status Wildlife and Plant Species				
Piping Plover	Continued seashore management under alternative A may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative A.	Alternative B may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, and surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative B.	Alternative C may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative C.	Alternative D may affect/is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect/are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative D.
Sea Turtles	While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative A. Therefore, overall the actions taken under alternative A may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and	Though surveying and management activities could greatly reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative B. Therefore the actions taken under alternative B may affect / are likely to adversely affect sea turtles. Past, current, and future activities both inside the seashore and within the state of North Carolina, when combined with the impacts of recreation use,	Though additional full recreational closures, camping and light restrictions, and increasing compliance with closures and other regulations would reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative C. Therefore actions taken under alternative C may affect / are likely to adversely affect all species of sea turtle. Past, current, and future activities both inside the seashore and within the state of North Carolina, when	While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative D. Therefore, overall the actions taken under alternative D may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and

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	recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative A.	surveying, and management of the species may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative B.	combined with the impacts of recreation use, surveying, and management of the species expected under this alternative may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative C.	recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative D.
Seabeach Amaranth	Surveying and management activities still provide the risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative A. Therefore the overall impacts of actions taken under alternative A may affect / are likely to adversely affect the seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative A.	Though surveying and management activities would protect both the plant and its habitat, greatly reducing the recreational impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative B. Therefore the overall actions under alternative B may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative B.	ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative C. While surveying and management activities would reduce these impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative C may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative C.	ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative D. While surveying and management activities would reduce these impacts, though not as much as under alternatives B or C, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative D may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative D.
State Listed and Special Status Species				
American Oystercatcher	Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on the American	Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on the American	Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on American oystercatchers. Because protection	Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on the American

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	oystercatcher. Because protection measures for nesting oystercatchers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use under alternative A would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative A.	oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative B would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative B.	measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative C.	oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative D.
Colonial Waterbirds	Under alternative A, surveying and recreational use would have long-term moderate adverse impacts on colonial waterbirds. Species management and other management would have long-term, minor impacts. Cumulative impacts would be long-term, minor to moderate, and adverse . Impairment to colonial waterbirds would not be expected to occur under alternative A.	Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds entail some risks and do not apply equally to all birds, recreational use under alternative B would likely lead to long-term minor to moderate adverse impacts. Cumulative impacts would be long-term, moderate to major adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative B.	Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative C.	Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely result in long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative D.
Wilson's Plover	Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term,	Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term,	Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on the Wilson's plovers. Because protection measures for nesting Wilson's plovers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use is likely to	Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term,

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	moderate to major, and adverse. Impairment on Wilson's plovers at Cape Lookout National Seashore would not occur under alternative A.	moderate to major, and adverse. Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative B.	lead to long-term major adverse impacts . Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative C.	moderate to major, and adverse. Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative D.
Red Knot	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be limited . Since red knots rest and feed only during the fall and winter when recreation use is low, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative A.	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative B.	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore, and impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knot would not occur under alternative C.	The red knot is a winter, fall, spring and occasional summer visitor at the seashore, and impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative D.
Other Wildlife and Wildlife Habitats				
Invertebrates	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative A. Continuing to prohibit ORV traffic from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Though driving in the intertidal zone outside of these areas would have negligible impacts, doing so would require driving across wrack lines. In areas where there is continual disruption of the wrack line there would be long-term moderate adverse	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative B, but it would be less than alternative A. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would be negligible throughout the seashore. Closing key piping plover migratory/wintering habitat would provide long-term moderate benefits by protecting	Under alternative C the management measures for the protected species would enhance the protection of invertebrates more than alternative A, but slightly less than alternative B. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would continue to be negligible throughout the seashore. Closing key piping plover migratory/wintering habitat as well as the northern 2 miles of South	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative D and would be less than alternative A, but more than alternatives B and C. Impacts within the intertidal zone would continue to be negligible throughout the seashore. Seasonally closing Middle Core Banks, "Ophelia Banks," and the northern 2 miles of South Core Banks would provide short-term minor to moderate benefits . By not restricting night driving, impacts on ghost crabs would be similar to alternative A, though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	impacts on the invertebrate population inhabiting this area, though the extent to which the wrack would be disturbed throughout the entire seashore is indeterminate at this time. To the extent that ORVs drive on softer intertidal sand flats, there would be long-term moderate impacts on soft-bodied animals, for even relatively few vehicle passes can decimate the animals. Though current levels of nighttime driving are not known, given the limited amount of night use in the past, the availability of the backroad network system, and the limited accessibility of the seashore to vehicles, allowing night driving would cause long-term negligible adverse impacts on the ghost crab population. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would continue to result in long-term negligible to moderate adverse impacts on invertebrates in the seashore depending upon the species. Though some of the ORV impacts on invertebrates would be long-term moderate adverse , the impacts would not be at a level that would threaten the existence of the invertebrate populations within the entire seashore. Invertebrate populations at the seashore would not be impaired under alternative A.	all invertebrate species in these areas and allowing them to recover to natural levels. Closing Middle Core Banks and “Ophelia Banks” and the northern 2 miles of South Core Banks to ORVs would provide short-term minor to moderate benefits . Ghost crabs inhabiting the beach between Ramp 41B and Ramp 44 would be completely protected by prohibiting night driving, and encouraging drivers to use the backroads at night would result in impacts that were long-term minor to moderate beneficial (depending upon the current level of impact). The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative B.	Core Banks to ORV traffic year round would provide long-term moderate benefits . Closing Middle Core Banks and “Ophelia Banks” would provide short-term minor to moderate benefits . By not restricting night driving, impacts on ghost crabs would be similar to alternative A, though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative C.	would still be impacted by ORVs. The total amount of impact throughout the seashore would be less than alternative A, but more than alternatives B and C due to the number of year-round and seasonal ORV closures. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative D.
Other Bird Species	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	term, minor and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor and adverse. Impairment to other bird species would not occur under alternative A.	term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative B.	term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative C.	term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative D.
Visitor Use	<p>Alternative A would provide continued ORV access throughout the seashore, except within full recreational or ORV closure areas implemented for bird or turtle protection.</p> <p>When chicks or hatchlings become mobile, continued ORV access around expanded closures via a backroad or through closures via a limited escort program would result in short-term, minor, adverse impacts on ORV users.</p> <p>If closures that prevented ORV access through an area occurred at Cape Point, other inlets, or at multiple locations on South Core Banks and North Core Banks displacing ORV use for approximately one summer month, substantially less than 10% of annual ORV vehicle use days would be affected resulting in short-term minor to moderate adverse impacts on ORV users.</p> <p>ORV closures could result in some additional crowding and full recreational closures would restrict some pedestrian access resulting in short-term, minor, adverse impacts.</p>	<p>The closure of the northern 2 miles of South Core Banks and the closure of Middle Core Banks and “Ophelia Banks” would result in limited options for fishing or ORV use near inlets in comparison to alternative A.</p> <p>Potential ramp-to-ramp ORV closures to protect foraging American oystercatcher chicks would result in further restrictions on ORV use because oystercatchers nest throughout the seashore. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users, summer fishermen, and other recreational uses.</p> <p>However, if Cape Point was closed due to foraging chicks or hatching sea turtles, short-term, major adverse impacts could occur to anglers because many popular fishing areas would potentially be closed to ORV use. Because ORV access would continue to be maintained, impacts related to ORV closures around sea turtle nests and seabeach amaranth would be short-term and minor adverse.</p> <p>Camping prohibitions within 600</p>	<p>Similar to alternative B, permanent and seasonal species-related ORV closures would result in fewer options for fishing or ORV use near inlets.</p> <p>Potential ramp-to-ramp full-beach closures to protect mating American oystercatchers and expanded colonial waterbird buffers could result in further restrictions on ORV and other recreational uses. These combined restrictions could result in long-term, moderate to major, adverse impacts on ORV users and summer fishermen similar to alternative B because of reduced seashore-wide beach access.</p> <p>In the event that Cape Point was closed due to foraging chicks, impacts could be major adverse to summer anglers because many popular fishing areas would potentially be closed to ORV use.</p> <p>ORV and pedestrian impacts from sea turtle and seabeach amaranth buffers would be short-term and minor adverse. Camping prohibitions near sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry</p>	<p>Permanent and seasonal species-related closures would result in fewer options for fishing or ORV use near inlets.</p> <p>Additional closures encompassing all of Cape Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and the historical nesting areas of terns and skimmers could further restrict ORV and other uses. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users and other recreational users, similar to alternatives B and C, because of reduced seashore-wide beach access.</p> <p>Similar to alternative A, ORV impacts from sea turtle and seabeach amaranth closures would be short-term and minor adverse. Camping would be prohibited in all turtle nesting areas, resulting in impacts similar to alternative A.</p> <p>Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in long-term, minor, beneficial effects because compliance</p>

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	<p>Outreach efforts related to endangered species management and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.</p> <p>Long-term, minor, adverse cumulative impacts would occur.</p>	<p>feet of sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry campers, particularly in June and October, due to the number of nests that occur along South Core Banks and North Core Banks.</p> <p>Full recreational closures would result in short-term, minor, adverse impacts on pedestrians because they would continue to have access around most recreational closures.</p> <p>However, prohibition of pets within the seashore would result in long-term, moderate, adverse impacts on those visitors who regularly bring their pets to the seashore during the summer.</p> <p>Outreach efforts and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>	<p>campers.</p> <p>However, pets would be allowed within in the seashore, but not within full recreational closure areas, resulting in long-term, minor, adverse impacts on those visitors who travel with their pets.</p> <p>Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in long-term, moderate, beneficial effects; increased enforcement of species management requirements could result in long-term minor to moderate beneficial impacts.</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>	<p>surveying would be similar to alternative A (less frequent than under alternative C).</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>
Socioeconomic Resources	<p>Implementation of alternative A would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, or some tourist-related businesses located in Carteret County, for overall visitor use at the seashore has increased nearly every year for the past 10 years while management practices have remained consistent. The duration of impacts, if any, would likely be short-term and occur on a yearly</p>	<p>Implementation of alternative B would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative were</p>	<p>Implementation of alternative C would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with this alternative's increased outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative</p>	<p>This alternative incorporates species management measures from all of the other alternatives and provides ORV and pedestrian access. However, additional closures would encompass all of Cape Lookout Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and historical nesting areas of terns and skimmers. These combined restrictions would result in the</p>

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	basis. Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse .	implemented. However, some anglers, pet owners, and campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of impacts, if any, would likely be long-term . Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse .	were implemented. However, some anglers and campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of any impacts would likely be long-term . Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts under alternative C would be long-term minor and adverse .	most reduced seashore-wide beach access of all the alternatives, and ORV users and anglers would be most impacted due to the limited access to spits and potentially long expanses of oceanfront.
Seashore Management and Operations	Staffing levels and resources in all three divisions dedicated to protected species management activities would remain relatively constant. Existing staff would not always be able to meet protected species management needs resulting in long-term moderate adverse impacts on all divisions. Temporary actions such as implementation of an escort program and/or storm recovery operations would result in long-term, moderate, adverse impacts on all divisions. The implementation of protected species management programs for all three divisions would cost approximately \$478,313 under alternative A. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate impacts. The cumulative impacts under alternative A would	Staffing levels and resources would increase for all three divisions. The total additional funding required under alternative B would be \$554,800 for the first year and \$351,800 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term moderate adverse impacts on the interpretation division and short- and long-term major adverse impacts on resource management and law enforcement. Temporary events such as the escort program and storms may result in long-term moderate to major adverse impacts on all divisions. Cumulative impacts would be short-term moderate to major adverse and long-term moderate	Staffing levels and resources would increase for all three divisions. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The implementation of protected species management programs for all three divisions would cost an additional \$851,600 for the first year and \$610,600 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source	Staffing levels and resources in the interpretation and resource management divisions would increase, while law enforcement staff would not increase. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would still be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The implementation of protected species management programs for all three divisions would cost an additional \$147,500 under

TABLE A: SUMMARY OF IMPACTS

Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	impacts under alternative A would be short-term moderate and long-term moderate adverse .	adverse and long-term moderate adverse .	cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term major adverse impacts on all divisions. Cumulative impacts would be short- and long-term moderate to major adverse .	alternative D. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate to major impacts, depending on the frequency and duration of the events. Cumulative impacts would be short- and long-term moderate adverse .

Purpose of and Need for Action

PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

This “Purpose of and Need for Action” chapter describes the reasons why the National Park Service (NPS) is taking action at this time, which is to evaluate a range of alternatives and management actions for sensitive species protection at Cape Lookout National Seashore (the seashore or the park). This *Interim Protected Species Management Plan / Environmental Assessment* (plan/EA) presents three action alternatives for managing sensitive species and assesses the impacts that could result from continuing the current management strategy (the no-action alternative) or implementing any of the three action alternatives. Upon conclusion of the plan/EA and decision-making process, one of the four alternatives would become the interim protected species management plan and guide future actions while a long-term off-road vehicle (ORV) management plan / environmental impact statement (plan/EIS) is developed for the seashore.

PURPOSE OF AND NEED FOR ACTION

The “Purpose of the Plan” explains what the plan/EA intends to accomplish. The “Need for Action” explains why action is necessary at this time. Brief summaries of both purpose and need are presented here; however, more information is available in the “Background” section of this chapter.

PURPOSE OF THE PLAN

The purpose of taking action at this time is to evaluate and implement strategies to protect sensitive species and prevent adverse effects to protected species, while allowing for appropriate recreational use as directed in the seashore’s enabling legislation, NPS management policies, the Endangered Species Act, the Migratory Bird Treaty Act, and other laws and mandates until a long-term ORV management plan/EIS is developed.

NEED FOR ACTION

An interim protected species management plan/EA would meet the following needs until the long-term ORV management plan/EIS is completed:

- The need for a guide to management practices for protection of species over the next 3 to 4 years until a long-term ORV management plan and regulations are developed.
- The need for a management plan on which to consult with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act.
- The need for a management plan that complies with the Endangered Species Act, the Migratory Bird Treaty Act, NPS management policies, and park enabling legislation, and that avoids adverse effects to protected species.

OBJECTIVES IN TAKING ACTION

Objectives are “what must be achieved to a large degree for the action to be considered a success” (NPS 2001a). All alternatives selected for detailed analysis must meet project objectives to a large degree, and resolve the purpose and need for action. Objectives must be grounded in the park’s enabling legislation, purpose, significance, and mission goals, and be compatible with direction and guidance provided by the park’s general management plan, strategic plan, and/or other management guidance. The following are objectives for developing this interim protected species management plan/EA:

PURPOSE OF AND NEED FOR ACTION

- **Management Methodology**
 - Formalize adaptive interim management practices and procedures that have the ability to respond to changes in the seashore's dynamic physical and biological environment.
 - Provide procedures for prompt and efficient public notification of protected species management actions including the reasons for these actions.
 - Continue an ongoing and meaningful dialogue with the multiple public groups interested in and affected by protected species management to ensure development of a workable plan.
- **Visitor Use and Experience**
 - Provide for continued recreational use and access consistent with required management of protected species.
 - Increase opportunities for public awareness and understanding of NPS resource management and visitor use policies and responsibilities as they pertain to the seashore and protected species management.
- **Threatened, Endangered, and Other Protected Species**
 - Provide protection for threatened, endangered, and other protected species (e.g., state-listed species) and their habitats from adverse impacts related to recreational uses as required by state and federal laws and policies.
 - Actively consult and cooperate with the USFWS to ensure that NPS management actions comply with the requirements of the Endangered Species Act.
- **Park Management and Operations**
 - Develop an interim protected species management plan/EA that minimizes impacts to other park operations.

PROJECT SITE LOCATION

Cape Lookout National Seashore was authorized as a unit of the National Park Service on March 10, 1966, but did not gain ownership of the land until 1976. It is located three miles off the mainland coast in the central coastal area of North Carolina and occupies more than 29,000 acres of land and water from Ocracoke Inlet on the northeast to Beaufort Inlet to the southwest (see "Figure 1: Vicinity Map"). The 56 miles of barrier islands consist mostly of wide, bare beaches with low dunes covered by scattered grasses, flat grasslands bordered by dense vegetation, and large expanses of salt marsh alongside the sound.

Natural processes are continually changing the shape of the barrier islands, and currently Cape Lookout consists of five islands (see "Figure 2: Park Map"). The northernmost island, North Core Banks is approximately 19 miles long, extending from Ocracoke Inlet to Old Drum Inlet. From Old Drum Inlet to New Drum Inlet is a three-mile-long island of land formerly connected to North Core Banks known as Middle Core Banks. A three-quarter mile section of South Core Banks south of New Drum Inlet, sometimes referred to as "Ophelia Banks," was isolated with the creation of a new inlet following Hurricane Ophelia. South Core Banks extends southward from the newly created inlet 25 miles to the Cape Lookout bight area. These four islands, known collectively as the Core Banks, have a northeast to southwest orientation and exhibit a low profile landscape. The fifth island, Shackleford Banks, is 9 miles long and has an east-west orientation with a higher dune system and larger areas of vegetation. No road connects the islands of Cape Lookout to the mainland or to each other and the only access to the seashore is by private boat or ferry. The geographic study area for this plan/EA includes all of the Core Banks.



FIGURE 1: VICINITY MAP

PURPOSE OF AND NEED FOR ACTION



FIGURE 2: PARK MAP

BACKGROUND

The Outer Banks of North Carolina formed as a result of changes in sea level, wave and wind action, and ocean currents. These factors continue to influence the islands today through the processes of erosion and accretion of the shoreline; overwash across the islands; and the formation, migration, and closure of the inlets (NPS 1979). Since the 1930s, these natural processes have been influenced by human actions such as dredging inlets.

While the number of human visitors to Cape Lookout National Seashore has grown, the breeding population of the federally threatened piping plover (*Charadrius melodus*) (USFWS 1996a) and the occurrence of seabeach amaranth (*Amaranthus pumilus*) (USFWS 1996b) have declined within the seashore and surrounding areas. Furthermore, statewide declines were documented for common terns (*Sterna hirundo*), least terns (*Sterna antillarum*), gull-billed terns (*Sterna nilotica*), black skimmers (*Rynchops niger*), and American oystercatchers (*Haematopus palliatus*); all of which are, or are being considered for listing as Species of Special Concern by the North Carolina Wildlife Resources Commission. Recreational pressure has been implicated in low reproductive success and declining population trends for all of these species, as well as for disturbance and/or mortality of migrating and wintering piping plovers, colonial waterbirds, and oystercatchers, and adults, nests, and hatchlings of the four species of sea turtles that nest at the seashore [the federally threatened loggerhead (*Caretta caretta*) and green turtle (*Chelonia mydas*), and the federally endangered leatherback turtle (*Dermochelys coriacea*) and Kemp's ridley sea turtle (*Lepidochelys kempii*)] (NMFS and USFWS 1991a, 1991b, 1992a, 1992b).

Increased use by the public for recreational purposes has necessitated the development of a long-term ORV management plan/EIS to meet the requirements of Executive Orders 11644 and 11989 regarding the use of ORVs on public lands, and to meet the requirements for protection of federally listed species under Sections 7(a) (1) and (2) of the Endangered Species Act and other state and park listed sensitive species. According to the NPS *Management Policies 2001*: "The NPS will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species." The Endangered Species Act directs federal agencies to carry out programs for the conservation of endangered and threatened species, and ensures that any action authorized, funded, or carried out by an agency is not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat.

The development of an interim protected species management plan/EA at Cape Lookout National Seashore is in part the result of two petitions for rulemaking submitted to the NPS, related to ORV use. The first petition was submitted on December 9, 1999, on behalf of the Bluewater Network and 70 environmental organizations. This petition requested an immediate ban on the use of all-terrain vehicles, dune buggies, sand buggies, and other four-wheel drive vehicles on all off-road areas in the National Park System. This petition was NPS-wide, and while it included Cape Lookout National Seashore, it was not specific to the seashore. Petitioners stated that current off-road use of dune buggies, all-terrain vehicles, sand buggies, and four-wheel drive vehicles in 23 national park units threatened the mandate that parks remain "unimpaired for the enjoyment of future generations" (Bluewater Network 1999).

In the petition, Bluewater Network also took issue with the enabling, or other legislation associated with five of the parks, insofar as the legislation specifically allows for ORV use. The group argued that such legislative allowances run contrary to the NPS mission and charter. Bluewater Network therefore requested that NPS make a recommendation to Congress to amend the legislation to fall in line with the NPS non-impairment doctrine. Furthermore, the Bluewater Network stated that one 1999 survey of ORV use in the parks found 40 park units with high amounts of illegal use. To address this, the petition

requested that the NPS issue an advisory to increase the enforcement of the present rules (Bluewater Network 1999).

The second petition was specific to actions occurring at Cape Hatteras National Seashore, located just north of Cape Lookout National Seashore. On June 7, 2004, a Petition for Rulemaking Governing Off-Road Vehicle Use in the Cape Hatteras National Seashore was submitted to the Secretary of the Department of the Interior, the Director of the NPS, and the Superintendent of the Outer Banks Group by the National Parks Conservation Association, the Wilderness Society, and the Natural Resources Defense Council, also referred to as the petitioners. This petition requested that the NPS promulgate regulations regarding the use of ORVs in the Cape Hatteras National Seashore. The petitioners first state that the informal authorization of ORV use at the seashore violates the federal Endangered Species Act because it does not conserve endangered and threatened species and was implemented without consultation for all affected species with the USFWS. Second, the petitioners state that the absence of a formal, promulgated ORV management plan violates Executive Orders and federal regulations regarding ORV use in the National Park System. The third claim states that the informal authorization does not protect the seashore's natural resources and, consequently, violates the Organic Act of 1916, the General Authorities Act of 1970, the Cape Hatteras National Seashore enabling legislation, and various NPS management policies (NPCS 2004).

On May 17, 2005, Defenders of Wildlife (Defenders), a non-profit environmental organization, issued a notice of intent to sue the NPS for alleged violations of the Endangered Species Act, 16 U.S.C. §§ 1531 et seq., the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq., the Migratory Bird Treaty Act, 16 U.S.C. §§ 703 et seq., the NPS Organic Act, 16 U.S.C. §§ 1601 et seq., and the enabling legislation for Cape Hatteras National Seashore, 50 Stat. 669 (1937). Defenders alleged that the NPS continuing authorization of ORV use at Cape Hatteras National Seashore without first engaging in formal consultation with the USFWS “violates the agency’s obligations under the [Endangered Species Act] to carry out programs for the conservation of endangered and threatened species and may be resulting in the take of those species.” Defenders also alleged that the continued authorization of ORV use at the seashore without an assessment of environmental impact violates NEPA. Defenders alleged that NPS actions have also caused the death of numerous migratory birds in violation of the Migratory Bird Treaty Act. Lastly, Defenders argued that “the NPS has flagrantly acted contrary to two executive orders, agency regulations, and the organic acts of both [Cape Hatteras National Seashore] and the NPS by authorizing ORV use without first developing a long-term ORV management plan/EIS in a national seashore area intended to be ‘permanently reserved as a primitive wilderness’” 50 Stat. 669 (1937).

Until the long-term ORV management plan/EIS for Cape Lookout National Seashore is complete, the NPS wishes to establish an interim protected species management plan/EA to ensure for the proper management of protected species and comply with the Endangered Species Act, while also providing for adequate use of the seashore's recreational resources. The species addressed in this plan/EA are those specifically affected by recreation use within the seashore that are listed federally or by the state as threatened, endangered, or species of special concern and/or are of special concern to the seashore. To implement such a plan, NPS must complete an environmental assessment in accordance with NEPA.

SUMMARY OF PROTECTED SPECIES MANAGEMENT AT CAPE LOOKOUT NATIONAL SEASHORE

Providing a variety of important habitats, Cape Lookout National Seashore plays a vital role in the survival of many wildlife species. Be it for nesting, resting, or feeding, the seashore provides for a diverse assemblage of birds. Rich, varied habitats and locations along the Atlantic Flyway contribute in attracting birds to the seashore. In 1999, the American Bird Conservancy designated Cape Lookout National Seashore as a Globally Important Bird Area in recognition of the value the seashore provides to bird migration, breeding, and wintering (American Bird Conservancy 2005). The seashore is home to the federally listed piping plover. In addition, the seashore provides nesting habitat for several species of

state-listed colonial waterbirds, including the common tern, least tern, gull-billed tern, and black skimmer. Solitary nesters, such as the American oystercatcher and Wilson's plover (*Charadrius wilsonia*) also use Cape Lookout National Seashore as a breeding ground, and the red knot (*Calidris canutus rufa*), which uses the seashore as wintering habitat and during spring and fall migrations.

Cape Lookout National Seashore is used as nesting habitat by four federally listed sea turtles: the loggerhead, green, leatherback, and Kemp's ridley. One other federally listed sea turtle species, the hawksbill (*Eretmochelys imbricata*), occupies the surrounding waters.

The federally listed seabeach amaranth, a coastal plant, has also been documented at the seashore.

All the above listed species are discussed in detail in the "Affected Environment" chapter of this document. The following provides a brief description of the status of the species at the park and existing management.

PROTECTED BIRD SPECIES

Piping Plover

Cape Lookout National Seashore is home to the Atlantic Coast piping plover population, which ranges from the Maritime Provinces of Canada to the Outer Banks of North Carolina, as well as migrating birds from the Great Lakes (along Lake Superior and Lake Michigan) and Great Plains populations (from southern prairie Canada to Iowa) (USFWS 1996, 2003). The Atlantic Coast population of piping plover was listed as threatened in 1986 and increased from approximately 800 pairs to almost 1,350 pairs in 1995. However, pressure on Atlantic Coast beach habitat from development and human disturbance is pervasive and unrelenting, and the species is sparsely distributed. Habitat loss caused by human development and recreation, and low reproductive rates caused by human disturbance and predation were considered to be the primary causes of the decline (Haig 1992, Haig and Elliot-Smith 2004). From 1989 to 2003, the number of breeding pairs in North Carolina declined by more than 50% (USFWS 2004b). The Atlantic Coast population recovery plan recommends that piping plover populations and breeding habitat be managed to maximize survival and productivity through: survey and management of wintering and migration areas to maximize survival and recruitment into the breeding population; scientific investigations that will facilitate recovery efforts; developing and implementing public information and education programs; and reviewing progress towards recovery of the species annually, revising recovery efforts as appropriate (USFWS 1996a).

Wintering grounds for the Great Lakes population range from North Carolina to Florida and along the Florida Gulf Coast to Texas, Mexico, and the Caribbean Islands. On these wintering grounds, piping plovers forage and roost along barrier and mainland beaches, sand, mud, algal flats, washover passes, salt marshes, and coastal lagoons. The Great Lakes population recovery plan strategy includes the following: increase average reproduction; protect essential breeding and wintering habitat; increase genetic diversity to levels needed to maintain population persistence; increase public education and outreach; and establish and maintain funding mechanisms and partnerships for long-term protection and management (USFWS 2003).

The first records of nesting piping plovers at Cape Lookout National Seashore are from the 1983 and 1986 nesting seasons; 14 nesting pairs in 1983 and 25 pairs in 1986 were found on North Core Banks (Fussell 1986). Official monitoring of nesting piping plovers at the seashore began with a baseline study in 1989 with 37 documented nests (NPS 2004b). Cape Lookout National Seashore is a significant nesting area with about two-thirds of the nesting pairs in the state of North Carolina. The nesting population at the seashore reached a peak of 39 pairs in 1994 and declined for 10 years to a low of only 13 pairs in 2004 (Cordes 2004). In 2005, numbers rebounded to a total of 27 nesting pairs. Ten different nesting sites have been identified in the park.

American Oystercatcher

North Carolina supports approximately 327 pairs of American oystercatchers, a large, conspicuous shorebird with long pink legs and a long, bright reddish-orange bill identified in the *U.S. Shorebird Conservation Plan* as a “Species of High Concern” (USFWS 2004a). Studies estimate the Outer Banks region of North Carolina supports 90 breeding pairs or 27% of the state population (Simon et al. 2004). Oystercatcher breeding success in North Carolina has been extremely low, with one egg in 32 hatching (Davis et al. 2001). In response to low reproductive rates in 2005, the North Carolina Wildlife Resources Commission and the Southeastern Shorebird Conservation Plan proposed for listing the American oystercatcher as a state-listed species of special concern (Meyers 2005). The listing has yet to be approved by the state General Assembly (Gerwin 2005).

Monitoring of American oystercatchers’ reproductive success in North Carolina began in 1995 and continues at Cape Lookout National Seashore and Cape Hatteras National Seashore on an annual basis. An average of 58 pairs nested at Cape Lookout National Seashore between 1998 and 2004. Hatching success was found to be highly variable among years and among locations along the coast of North Carolina. The primary focus of management at Cape Lookout National Seashore as it relates to the American oystercatcher has been to find ways to minimize the impacts of park visitors and ORV users and improve nesting success. The management goals include continuing long-term monitoring and research.

Colonial Waterbirds

Ground nesting colonial waterbirds breed along the seashore beaches, which also host nesting sites for other birds, as well as a range of recreational activities. Colonial waterbirds identified at Cape Lookout National Seashore as species to consider in the development of this interim protected species management plan/EA include gull-billed terns, common terns, least terns, and black skimmers. Gull-billed terns are a state-listed threatened species and the other three are state-listed species of special concern (Erwin 2005). None of these species are federally listed. In 2001, the seashore was designated a Globally Important Bird Area by the American Bird Conservancy (2005) to reflect this diversity.

The Outer Banks region of North Carolina supports a large number of colonial waterbird species that depend upon its extensive sounds and the near-shore waters for feeding, and relatively undisturbed islands for nesting. Most species of colonial waterbirds are in jeopardy in the state due to a decline in numbers over the past 20 to 30 years (Parnell et al. 1977).

Statewide counts of colonial waterbirds are conducted every 3 years. Cape Lookout staff carries out the censuses of beach nesting species. The results of these surveys provide the status of species of special concern and can help set management priorities. The statewide counts of colonial waterbirds have shown a decline in beach nesting species at Cape Lookout; however, nesting success varies greatly from year to year.

Wilson’s Plover

Wilson’s plover, readily distinguished from other similar ringed plovers by its larger size, distinctive bill, and flesh-colored legs, has been proposed for listing as a state-listed species of special concern and is identified in the *U.S. Shorebird Conservation Plan* as a “Species of High Concern” (USFWS 2004a). Cape Hatteras National Seashore does not specifically survey for Wilson’s plovers, but notes their presence when surveying for other bird species. A 2004 survey of the entire coast of North Carolina yielded 232 pairs of Wilson’s plover. Of those, Cape Lookout National Seashore supported 61 nesting pairs of Wilson’s plover throughout the seashore, with the greatest concentration at Power Squadron Spit.

Red Knot

The red knot is a shorebird that breeds in the Canadian arctic and is known to visit North Carolina, the Outer Banks, and the entire eastern seaboard of the United States only as a migrant and occasional winter

resident (Harrington 2001). Red knot has been identified in the *U.S. Shorebird Conservation Plan* as a “Species of High Concern” (USFWS 2004a). Currently the seashore surveys for red knot while surveying for other protected species during the winter migrating months but no specific management measures are taken for the species.

SEA TURTLES

Five species of sea turtles are found in the waters around Cape Lookout National Seashore: loggerhead, green, leatherback, and Kemp’s ridley all nest in the park, with the majority of nests occurring on the South Core Banks (53%), followed by the North Core Banks (34%) and Shackleford Banks (13%). Hawksbill turtles have rarely been found as dead strandings at the seashore. Surveying and management of the sea turtles at the seashore follow USFWS guidelines, and, where appropriate, the individual sea turtle recovery plans (NMFS and USFWS 1991a, 1991b, 1992a, 1992b) and the North Carolina Wildlife Resources Commission’s Handbook for Sea Turtle Volunteers in North Carolina (NCWRC 2003).

Since 1976 seashore staff, Student Conservation Association interns, resource assistants, and volunteers have conducted nesting sea turtle surveys. Baseline data was collected for a portion of South Core Banks during an extensive 6-year study from 1978 to 1983. Nesting turtles were tagged and nests marked during nightly patrols. Since 1984, Cape Lookout National Seashore has conducted daytime monitoring to document strandings, protect nest sites, relocate nests in danger of being flooded, and protect hatchlings. The monitoring procedures used at the seashore prior to 1990 were significantly different than those used after that year, as 1990 marked the beginning of monitoring procedures following the USFWS Index Nesting Beach program.

Loggerhead

Loggerhead sea turtles were listed as threatened under the Endangered Species Act in 1978. The recovery plan identifies coastal development, commercial fisheries, and pollution and threats to the loggerhead population (USFWS 1991a). The six actions needed to achieve recovery are (1) provide long-term protection to important nesting beaches, (2) ensure at least 60% hatch success on major nesting beaches, (3) implement effective lighting ordinances or lighting plans on all major nesting beaches within each state, (4) determine distribution and seasonal movements for all life stages in a marine environment, (5) minimize mortality from commercial fisheries, and (6) reduce the threat from marine pollution.

Green

Nesting habits for the green turtle are very similar to the loggerhead turtle. Average clutch sizes range from 110 to 115 eggs, though this varies by population, and only occasionally do females produce clutches in successive years. Usually two, three, four or more years occur between breeding seasons (NMFS and USFWS 1991b).

Green turtles nest sporadically at Cape Lookout National Seashore with a total of 11 nests since 1990. A peak of four nests was documented in 1998.

Leatherback

Leatherback are infrequent nesters in North Carolina and also breed primarily in the tropics. Cape Hatteras National Seashore, just north of Cape Lookout National Seashore, is the northernmost nesting site for leatherbacks on the Atlantic Coast (Rabon et al. 2004).

It is known, though, that more than one individual leatherback has recently nested in North Carolina. In 2004 a leatherback turtle nest was found at Cape Hatteras National Seashore the same night that one was found at Cape Lookout National Seashore (Lyons 2005a).

Seabeach Amaranth

Seabeach amaranth is an annual plant native to barrier island beaches along the Atlantic Coast, including those within the Cape Lookout National Seashore. Historically, seabeach amaranth was found in nine states from Massachusetts to South Carolina, but was federally listed as threatened by the USFWS in 1993 due to its vulnerability to human and natural impacts and the fact that it had been eliminated from two-thirds of its historic range (USFWS 1996b).

Surveys to locate and count seabeach amaranth plants at Cape Lookout National Seashore began in 1993 and are conducted annually in late-July and early-August to track plant numbers and distribution and to identify areas for closure. At the seashore most of the plants are found on the south facing beaches of Shackleford Banks and the area between Cape Point and Power Squadron Spit. Monitoring has shown the number of plants varying greatly, reaching a high of 2,265 in 1993, and a low of 4 in 1996. Some of the fluctuation can be attributed to storm events that temporarily change the habitat conditions for the plant.

RECREATION AND PROTECTED SPECIES MANAGEMENT

Not only does Cape Lookout National Seashore provide habitat for a variety of federal and state-listed species and sensitive species, it serves as a popular recreation destination, with over 720,000 visitors in 2004 (NPS 2005c). Following its enabling legislation and mission, Cape Lookout National Seashore must find balance in the needs for species protection and visitor use.

On February 8, 1972, President Richard Nixon issued Executive Order 11644: *Use of Off-road Vehicles on the Public Lands* to “establish policies and provide for procedures that will ensure the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.” The Executive Order directs agencies to develop and issue regulations and administrative instructions to provide for administrative designation of the specific areas and trails on public lands on which the use of ORVs may be permitted, and areas in which the use of ORVs may not be permitted.

Executive Order 11989: *Off-Road Vehicles on Public Lands*, issued on May 24, 1977 by President Jimmy Carter, directs agencies to immediately close off-road areas or trails to ORVs when it is determined that the use of ORVs will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat, or cultural or historic resources to the type of ORV causing such effects, until such time as determined that such adverse effects have been eliminated and measures have been implemented to prevent future recurrence. Also included in the Executive Order is the authority to adopt the policy that portions of the public lands under an agency’s jurisdiction shall be closed to use by ORVs except those areas or trails that are suitable and specifically designated as open to such use.

Cape Lookout National Seashore does not have an established ORV management plan. ORVs that come onto the islands via the vehicle-passenger ferries can access beaches without obtaining a permit, 24 hours per day, when the ferries operate from approximately March or April through December, excluding areas closed for resource protection or safety reasons. While the number of human visitors to the seashore has increased over time, the breeding population of the federally threatened piping plover and seabeach amaranth has declined along with documented statewide declines for common terns, least terns, gull-billed terns, black skimmers, and American oystercatchers. Recreational pressure has been implicated in low reproductive success and declining population trends for all of these species, as well as for disturbance and/or mortality of migrating and wintering piping plovers, colonial waterbirds, and American oystercatchers. Adults, nests, and hatchlings of the four species of sea turtles that nest at the seashore have also been impacted by recreational use.

The introduction of vehicle-passenger ferries to the Core Banks facilitated visitor access to the islands and resulted in increased vehicle use on beaches for recreational purposes. Presently at the seashore, ORVs are used for recreational fishing, sightseeing, travel to and from camping areas, and pleasure driving. In 2004, the NPS began preliminary planning for ORV management as required by federal law and regulations. This process would result in a long-term ORV management plan/EIS and a special regulation.

The long-term ORV management planning effort is based on the recognition by the NPS that ORVs must be regulated in a manner that is not only consistent with applicable law, but also appropriately addresses resource protection (including protected, threatened, and endangered species), potential conflicts among the various seashore users, and visitor safety. Executive Orders 11644 and 11989 require certain federal agencies permitting ORV use on agency lands to publish regulations designating specific trails and areas for this use. Title 36, section 4.10 of the Code of Federal Regulations implements the executive orders by providing that routes and areas designated for ORV use shall be promulgated as special regulations. Section 4.10 also provides that the designation of routes and areas shall comply with Executive Order 11644 and with section 1.5 of Title 36 of the Code of Federal Regulations.

SCOPING PROCESS AND PUBLIC PARTICIPATION

NEPA regulations require an “early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.” To determine the scope of issues to be analyzed in depth in this plan/EA, meetings were conducted with seashore staff and other parties associated with preparing this document, including public scoping meetings.

Public Scoping Meetings

The public was given the opportunity to learn about the planning process and provide input during two public scoping meetings held in early November 2005. Both meetings were held as open-house style sessions with short presentations, which allowed the public to ask seashore staff questions and provide input to the park in a more informal atmosphere. These sessions occurred November 8 from 6:00 PM to 9:00 PM at the Duke Marine Lab in Beaufort and November 9 from 6:00 PM to 9:00 PM at the Core Sound Waterfowl Museum on Harkers Island. These sessions were not recorded and a facilitator was not present; however, NPS representatives did record comments. A total of 15 people attended the meeting at the Duke Marine lab, and 13 people attended the meeting on Harkers Island.

To keep the public involved and informed following the public scoping meetings, individuals were given the option to receive notification of the availability of this document by either e-mail or mail, and the option to either download a copy or have a hardcopy mailed. Individuals were also given the option not to be placed on the mailing list, and an option to keep their name and address private.

NPS provided the public with a 30-day opportunity to participate in public scoping through the mail or on-line on the Planning, Environment, and Public Comment (PEPC) website. NPS also posted information on the public scoping meetings and on additional opportunities to comment before the December 9, 2005 comment deadline.

Though comments varied greatly, most comments focused on past and future NPS protected species management actions, ORV management actions, and visitor use and experience. Comments also focused on specific actions presented in the initial alternatives. It was explained that comments received should focus on the plan/EA, but may also be applicable to long term ORV management that would be handled by a regulation development process and an EIS. The opportunity for input into that process will be announced in coming months.

In response to public input and issues expressed during the scoping process, the interdisciplinary planning team reworked the conceptual alternatives presented at the meetings to those analyzed in this plan/EA.

As a result of this scoping effort (see the “Consultation and Coordination” chapter for additional information), several issues and impact topics were identified as requiring further consideration.

ISSUES AND IMPACT TOPICS

Issues describe problems or concerns associated with current impacts from environmental conditions or current operations, as well as problems that may arise from the implementation of any of the alternatives. Seashore staff identified potential issues associated with the plan/EA during internal scoping meetings, the public identified potential issues during public scoping, and state and federal agencies identified potential issues through correspondence.

- **Federally Listed Threatened and Endangered Species:** Recreational activities at the seashore could impact federally threatened or endangered species and their habitat, on the beach and soundside of the seashore. Conflicts between the listed species and recreational use could create direct or indirect losses to the species.

- **State-listed and Special Status Species:** Habitat for the American oystercatcher and colonial beach waterbirds may be vulnerable to recreational uses.
- **Other Wildlife and Wildlife Habitats:** Management of protected species at the seashore could result in adverse and beneficial impacts on other species using the same habitats.
- **Visitor Use and Experience:** Management of protected species could result in adverse and beneficial changes to visitor use and experience.
- **Local and Regional Economics:** Management of protected species could affect local and regional economics.
- **Seashore Management and Operations:** Accommodating recreational uses while protecting sensitive species requires sufficient park personnel and adequate funding. Park operations (staffing and funding) may be affected by protected species management strategies.

IMPACT TOPICS

The following impact topics are discussed in the “Affected Environment” chapter and analyzed in the “Environmental Consequences” chapter. These topics are resources of concern that could be beneficially or adversely affected by the actions proposed under each alternative. These were developed from the issues identified above to ensure that the alternatives are evaluated and compared based on the most relevant topics. Some issues were not carried through as impact topics; these are discussed with the reasons for their dismissal in the next section of this document.

Federally Listed Threatened and Endangered Species and Species of Special Concern

Impacts on piping plovers – The seashore is used by both the Great Lakes (wintering) and Atlantic Coast (breeding and migration) populations of the piping plover. Piping plover are known to exhibit site fidelity, making consistent protection of breeding sites important. At the seashore, piping plover are found both on the ocean and soundsides of the islands.

Impacts on sea turtles – Federally listed sea turtles (loggerhead, green, leatherback, Kemp’s ridley, and hawksbill) occur or nest at the seashore. Turtle closure plans under the interim protected species management plan would impact all recreational users by either opening or closing areas of the seashore for use.

Impacts on seabeach amaranth – Seabeach amaranth is a federally listed plant species found in limited numbers at the seashore. This species is found only where there is no disturbance from ORV driving or other activities.

State-listed and Other Special Status Species

Impacts on other protected species – Cape Lookout National Seashore supports a rich and varied bird community. To reflect this diversity, the American Bird Conservancy designated the seashore as a Globally Important Bird Area (American Bird Conservancy 2005). Ground nesting colonial waterbirds breed along the seashore beaches, which are also heavily used for recreational activities.

In 2004, the North Carolina Wildlife Resources Commission listed the American oystercatcher as significantly rare. In October 2004, meetings were held to discuss the status of some species in the state, including the American oystercatcher, and as a result, it was recommended that the state listing be changed to species of special concern. The *Southeastern Coastal Plains – Caribbean Regional Shorebird Plan* (Hunter et al. 2003) states that species in highest need of conservation (“extremely high”) include American oystercatcher, and the *U.S. Shorebird Conservation Plan* (USFWS 2004a) lists the American oystercatcher as a species of “high concern.”

Contributing to these low reproductive rates at the seashore is the need for large undisturbed areas required for successful breeding. Frequent human disturbance can cause the abandonment of nest sites as well as direct loss of eggs and chicks. It is unknown to what degree human activities directly or indirectly impact nesting efforts within the seashore.

During scoping it was noted that Wilson's plover and red knot are other species of concern that should be included in this interim protected species management plan/EA. Wilson's plover is not federally listed, but is proposed for listing by the State of North Carolina. On August 1, 2005, in response to the 80% decline in red knot population over the past 10 years, conservation groups filed an emergency petition asking the USFWS to list the red knot as an endangered species under the Endangered Species Act (Defenders of Wildlife 2005). The *Southeastern Coastal Plains – Caribbean Regional Shorebird Plan* (Hunter et al. 2003) states that species in highest need of conservation include red knot ("extremely high") and Wilson's plover ("high"). The *U.S. Shorebird Conservation Plan* (USFWS 2004a) lists the red knot as "highly imperiled" and the Wilson's plover as a species of "high concern."

Other Wildlife and Wildlife Habitats

Impacts on other wildlife, including migratory birds and invertebrates – Implementation of an interim protected species management plan would include resource closures, predator removal, and other management measures for the protected species. These closures and management measures may be used by other species (including other migratory birds) not included in the plan, and these closures may impact their populations as well. Beneficial impacts are possible as habitat would be protected for all migratory bird species and could also be adverse if an increase in protected species creates competition for resources.

Visitor Use and Experience

Impacts on visitor use and experience, including recreational activities – Potential closures and other actions associated with interim protected species management strategies could affect recreational access, including ORV access, and the ability of seashore visitors to participate in a variety of recreational activities. The seashore's enabling legislation provides for a variety of recreational uses; ORV use is popular, because it is a recreational use in itself and it facilitates other uses such as fishing, swimming, sunbathing, and birding. Other beach users engage in these same activities on foot, and may be restricted from some areas as a result of protected species management.

Socioeconomics

Impacts on the economy of local communities and concessionaires – Limiting recreational access, including ORV use, at the seashore as a result of protected species management closures could have an adverse effect on local economies because these areas rely on visitors purchasing goods and services, including ferry transport. The concessionaire that operates the ferry and the cabins at Long Point and Great Island could be affected by restrictions on ORV use if this use caused ORV users to forego their trip to the islands.

Seashore Management and Operations

Impacts on park staffing and funding – Under current staffing levels, resource closure and recreation related violations occur at Cape Lookout National Seashore. This will continue without increased education, surveying, and law enforcement efforts to improve compliance. The level of staff time and monetary resources required to implement a protected species management plan and its associated closures are of concern.

IMPACT TOPICS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

The following impact topics were eliminated from further analysis and consideration following discussions with the park staff:

Soundscapes

Vehicular and associated recreational noise is currently a component of the soundscape at the seashore, but is an element of the soundscape that is often incompatible with other recreational uses such as bird watching or enjoying solitude on the park beaches. Engine and recreational noise also create unsuitable habitat for seashore wildlife during breeding activities. Impacts related to soundscapes could occur wherever ORVs are allowed on the beach. Actions within Cape Lookout National Seashore must preserve natural quiet, while maintaining compliance with Director's Order 47: Sound Preservation and Noise Management.

Soundscapes is being eliminated in this interim protected species management plan/EA because defined area closures and ORV corridors have been developed and incorporated into the alternatives that would limit impacts to protected species at the seashore from vehicular and recreation noise to negligible or minor levels. Vehicles and people would be maintained at sufficient distances from breeding and nesting activity to prevent noise-related adverse impacts.

Additionally the ambient sound levels or background noise levels at the seashore are generally louder than in other natural park environments due to the ocean environment. The background sound produced by surf of the ocean is approximately 65 dBA (a measure of sound) according to a report by the Noise Pollution Clearinghouse on jet skis (Komanoff and Shaw 2000). At the seashore ORVs may be 4-wheel drive vehicles or all-terrain vehicles. On a highway, an SUV (as represented by a truck) averages approximately 70 dBA at 50 feet and 50 miles per hour (mph), a speed that is significantly higher than the speed limits proposed at the seashore (FHWA 1980). Similarly, an all-terrain vehicle averages 72 dBA at the same distance when operated slower than 35 mph according to the Bluewater Network (1999). Vehicle noise is created from three sources: tires contacting a surface, engine noise, and wind over the vehicle. None of these measurements considers the soft surface of the sand, which would produce much less tire-related noise than a highway or hard-packed trail and the slow vehicle speeds (less than 25 mph) that would be required by the management strategies. These factors would reduce the vehicular noise of ORVs to less than the 65 dBA created by the ocean. At a distance of 50 feet or more, natural ocean sounds would most likely mask the sound of ORVs. Therefore, for this interim plan/EA, soundscapes was dismissed from further analysis.

Coastal Barrier Ecosystem

A barrier island is a narrow, low-lying landform consisting of beaches, tidal flats, and sand dunes. Barrier beaches generally parallel ocean coasts and are separated from the mainland by a lagoon or bay, although some may be connected to the mainland. A barrier beach is a dynamic landform, constantly moving and reshaping in response to storms, sea level changes, and wave action. These processes are critical to the perpetuation of barrier beaches.

At Cape Cod National Seashore, 5 years of research were conducted to determine the ecologic and geomorphic effects of ORVs on coastal ecosystems. This research concluded that there was no carrying capacity for vehicular impact on coastal ecosystems and even low-level impacts can result in severe environmental degradation (UMASS 1979). A more recent study examined the ghost crab at Cape Hatteras National Seashore as an indicator for determining ecosystem health, since it may show the impacts of ORVs and other recreational uses. This study found that the presence of ORVs on the beaches of North Carolina have caused a dramatic decrease in the presence of ghost crab populations.

Similarly, the piping plover and other species considered in this interim protected species management plan/EA also serve as indicators of ecosystem health. According to the USFWS (2000), other threatened and endangered beach species that exist and breed along the Atlantic Coast are not endemic species. Thus, their listed status indicates widespread ecological problems. All of these species have many threats in common that include habitat loss and degradation and loss of nesting sites. If the status of these species is a reflection of an adversely affected and declining ecosystem, then the USFWS indicates that remedial

action must be aimed at the restoration of the coastal barrier ecosystem and not at just improving one species.

Towards this end, many protection efforts incorporated in the alternatives of this interim protected species management plan/EA benefit sensitive beach species (USFWS 2000), and thus serve to improve the coastal barrier ecosystem. For the life of this interim plan, the impacts associated with the management actions incorporated into the alternatives for species such as piping plovers will also be indicative of the potential impacts to coastal ecosystem health. Therefore, this impact topic was dismissed from further analysis in this plan/EA.

Water Resources

Water quality or quantity: Implementation of this plan/EA would involve the implementation of species surveying and management. These activities would not occur in the water and would not create sedimentation, erosion, increased runoff, or other situations that would have a potential to impact water quality. Vehicle access along the seashore would allow for some driving in the intertidal zone under all of the proposed alternatives. No impacts to water quality would occur from implementation of this plan/EA.

Streamflow characteristics: Actions related to implementation of an interim protected species management plan would not affect streamflow characteristics. The proposed actions would not occur in areas that would impact streamflow.

Marine or estuarine resources: Potential impacts related to intertidal driving, impacts to ghost crabs, benthic habitats, and/or other marine or estuarine resources are considered under “Wildlife and Wildlife Habitats,” as well as the individual protected species analyses.

Wetlands

Wetlands include areas that are inundated or saturated by surface or groundwater for a sufficient length of time during the growing season to develop and support characteristic soils and vegetation. NPS classifies wetlands based on the USFWS Classification of Wetlands and Deepwater Habitats of the United States, or the Cowardin Classification System (Cowardin et al. 1979). Based on the Cowardin Classification System, the entire shoreline of Cape Lookout National Seashore is defined as a wetland. Intertidal pools are located at Cape Point, as well as within the tidal flats near Portsmouth Village. Nesting areas occur near the soundside tidal flats, where many protected and other bird species nest. This area includes all activities related to the marine and tidal environment including intertidal driving, tidal flats, ghost crabs, etc.

NPS activities that have the potential to have adverse impacts on wetlands are subject to the provisions of Executive Order 11990 as implemented through Director’s Order 77-1. Such activities may include: (1) acquiring, managing, and disposing of NPS lands and facilities; (2) construction and related development activities; (3) permitting activities as provided for under NPS regulatory authorities; and 4) activities, programs, or planning efforts affecting use of NPS lands.

Director’s Order 77-1 states that

The basic test for determining if a proposed action will have adverse impacts on wetlands is if the activity has the potential to degrade any of the natural and beneficial ecological, social/cultural, and other functions and values of wetlands. Activities may require compliance due to direct impacts (e.g., location of a structure or fill in a wetland) or due to indirect impacts (e.g., secondary or offsite impacts that reach into wetlands). Examples of activities with the potential to have adverse impacts on wetlands include drainage, water diversion, pumping, flooding, dredging, filling, nutrient enrichment, diking, impounding, placing of structures or other facilities, livestock grazing, and other activities that degrade natural wetland processes, functions, or values.

Examples of wetland degradation include modifying flow, circulation, hydroperiod, or other aspects of the hydrologic regime; degrading natural biotic communities and processes including native plant and animal communities, habitat quality, floral and faunal productivity, and natural biodiversity; and degrading social/cultural values such as aesthetics, education, historical values, archeological resources, recreation, and scientific research.

Potential impacts to wetlands associated with the action alternatives would be associated with the placement of posts for stringed symbolic fencing through wetland habitats. Based on observation the posts are like stakes and would have no impacts on wetlands. It is likely that fencing would be placed around and not through wetlands.

There are no exceptions in Director's Order 77-1 that directly exempt species management plans, but Section 4.2.A.1.e. exempts: "Actions designed specifically for the purpose of restoring degraded (or completely lost) natural wetland, stream, riparian, or other aquatic habitats or ecological processes. For purposes of this exception, restoration refers to reestablishing environments in which natural ecological processes can, to the extent practicable, function at the site as they did prior to disturbance."

Wetlands were identified as an issue of concern during internal scoping with the park; however, upon further analysis, it was determined that under any of the alternatives impacts to wetland resources would not elevate above a short-term minor adverse impact due to recreational and essential vehicle use in these areas requiring vehicular traffic within the intertidal zone. This may impact protected species, such as when vehicles drive across the wrack line, which is discussed in detail in the "Wildlife and Wildlife Habitats" section. Therefore, it was determined that a Statement of Findings would not be necessary, and wetlands was dismissed as a resource area of concern in this document.

Rare or Unusual Vegetation

No known rare or unusual vegetation would be impacted by the implementation of this interim protected species management plan/EA. Riparian habitat would be minimally affected (see dismissal of Coastal Barrier Ecosystem). Seabeach amaranth, a federally listed plant species, is addressed under the "Federally Listed Special Status Wildlife and Plant Species" section in this document.

Unique or Important Fish or Fish Habitat

Unique or important fish or fish habitat would not be impacted by the implementation of an interim protected species management plan/EA. The plan/EA addresses terrestrial species and/or marine species, specifically sea turtles, when they are on land.

Air Quality

Cape Lookout National Seashore is located in an area classified by the U.S. Environmental Protection Agency as in attainment for all six criteria pollutants. Implementation of an interim protected species management plan would not impact air quality.

Invasive Species (Plant or Animal)

This interim protected species management plan/EA would not introduce nonnative species. No substantive evidence exists indicating that non-native vegetation is being transported into the park on vehicle tires, for example. Management of non-native predators is addressed under "Wildlife and Wildlife Habitats" and in the individual protected species sections for federally and state-listed species and special status species. Therefore, this impact topic was dismissed from further analysis in this plan/EA.

Prime Farmland

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. Prime farmland is protected under the Farmland Protection Policy Act of 1981 to minimize the extent to which

federal programs contribute to the unnecessary or irreversible conversion of farmland to nonagricultural uses. There are no prime or unique farmlands within the seashore.

Geological Resources and Geohazards

Potential impacts to geological resources from an interim protected species management plan/EA include the increased use of the backroad if additional closures are made. Impacts to soils on the backroad would be negligible.

No known geohazards are present within the seashore that could impact or be affected by the implementation of this interim protected species management plan/EA.

Unique Ecosystems, Biosphere Reserves, World Heritage Sites

The seashore has been designated as a biosphere reserve; however, implementation of an interim protected species management plan/EA would have no effect on this designation.

Cultural Resources

The National Historic Preservation Act (NHPA; 16 USC 470 et seq.), NEPA, NPS 1916 Organic Act, NPS *Management Policies 2001* (NPS 2000a), Director's Order 12 (Conservation Planning, Environmental Impact Analysis and Decision-making), and NPS-28 (Cultural Resources Management Guideline) require the consideration of impacts on any cultural resources that might be affected, and NHPA, in particular, on cultural resources either listed in, or eligible to be listed in, the National Register of Historic Places. Cultural resources include archeological resources, cultural landscapes, historic structures and districts, ethnographic resources, and museum objects, collections, and archives. Although no impacts are anticipated, copies of the plan/EA have been distributed to the North Carolina State Historic Preservation Officer for review and comment related to compliance with Section 106 of the NHPA.

Archeological Resources: Management of protected species does not include any excavation except the placement of posts for symbolic fencing.

Historic Structures and Districts: Management of protected species would not affect, alter, or cause harm to any historic structures or districts in or adjacent to the project area.

Cultural Landscapes: Cultural landscapes of the park would not be affected and potential viewshed impacts are considered under "Visitor Use and Experience."

Ethnographic Resources: Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Cultural Resource Management Guideline, DO-28: 181). There are no known ethnographic resources in either the project area or its general vicinity.

Museum Collections: Management of protected species would not affect, alter, or cause harm to any structures or buildings where museum collections are stored.

Paleontological Resources

No known paleontological resources occur within the project vicinity.

Traffic and Transportation

This interim protected species management plan/EA would not affect transportation or roadways within or around the seashore. Any additional vehicles added to the regional transportation network would be negligible. No additional need for parking would be created. ORV corridors and access are considered under "Visitor Use and Experience."

Land Use, Including Occupancy, Income, Values, Ownership, and Type of Use

Potential impacts from the implementation of an interim protected species management plan/EA to land use, including occupancy, income, values, ownership, and type of use, are considered under “Socioeconomics.”

Urban Quality, Gateway Communities

Although there are communities located adjacent to the seashore, none of these communities is an officially designated Gateway Community. Thus, implementation of an interim protected species management plan/EA would not impact urban quality or gateway communities.

Environmental Justice

On February 11, 1994, the President of the United States issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. The Executive Order is designed to focus the attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities. Environmental justice analyses are performed to identify the disproportionate placement of high and adverse environmental or health impacts from proposed federal actions on minority or low-income populations, and to identify alternatives that could mitigate these impacts.

Data from the U.S. Department of Commerce 2000 Census of Population and Housing (U.S. Census Bureau, U.S. Census 2000) were used for this environmental justice analysis. Minority populations included in the census are identified as Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and other Pacific Islander; other race; of two or more races; and Hispanic or Latino. Poverty status, used in this EA to define low-income status, is reported as the number of persons with income below poverty level. The 2000 Census defines the poverty level as an annual income of \$8,794 or less for an individual and an annual income of \$17,603 or less for a family of four.

Carteret County in North Carolina had a population of 59,383 in the year 2000, of whom 5,760 (or 9.7%) were minorities and 6,354 (or 10.7%) were living below poverty level. People of Hispanic or Latino origin comprised 101 (1.7%) of the total population. A total of 4,157 (7.0%) of the population were Black or African American; 238 (or 0.4%) were American Indian or Alaskan Native; 297 (0.5%) were Asian; 59 (0.1%) were Native Hawaiian or other Pacific Islander; 356 (0.6%) were of some other race; and 653 (1.1%) were of two or more races. It should be noted that people of Hispanic or Latino origin might be of any race. None of the minority populations were above the state or national averages for those populations.

The county has a poverty rate lower than the national average with 10.7% of the regional population living below the poverty level. The poverty rate for North Carolina was approximately 12%, and the poverty rate for the United States was 12%. Based on the definitions provided in the Executive Order for minority or low-income populations, there are no such populations that would be disproportionately impacted by the implementation of the proposed protected species management plan.

Energy Resources

The implementation of an interim protected species management plan/EA would not be expected to impact energy resources in the seashore because there are no such resources identified in the park.

Long-term Management

The interim protected species management plan/EA would be implemented while a long-term ORV management plan/EIS is developed; it would not impact long-term management at the seashore.

RELATED LAWS, POLICIES, PLANS, AND ACTIONS

The following laws, policies, and plans by the NPS, the state, or other agencies with neighboring land or relevant management authority are described in this section to show the constraints this plan/EA must operate under and the goals and policies that it must meet.

GUIDING LAWS AND POLICIES

NPS ORGANIC ACT OF 1916

In the NPS Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of the Interior and the NPS to manage units of the national park system “to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (16 U.S.C. § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 U.S.C. § 1a-1).

Despite these mandates, the Organic Act and its amendments afford the NPS latitude when making resource decisions about visitor recreation and resource preservation. By these acts Congress “empowered [the National Park Service] with the authority to determine what uses of park resources are proper and what proportion of the parks resources are available for each use” (*Bicycle Trails Council of Marin v. Babbitt*, 82 F.3d 1445, 1453 [9th Cir. 1996]).

Yet courts consistently interpret the Organic Act and its amendments to elevate resource conservation above visitor recreation. *Michigan United Conservation Clubs v. Lujan*, 949 F.2d 202, 206 (6th Cir. 1991) states, “Congress placed specific emphasis on conservation.” The court in *National Rifle Association of America v. Potter* says, “In the Organic Act Congress speaks of but a single purpose, namely, conservation.” The NPS *Management Policies 2001* also recognize that resource conservation takes precedence over visitor recreation. The policy dictates “when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant” (NPS *Management Policies 2001*, 1.4.3).

Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values. Yet, the NPS has discretion to allow negative impacts when necessary (NPS *Management Policies 2001*, sec. 1.4.3).

While some actions and activities cause impacts, the NPS cannot allow an adverse impact that constitutes resource impairment (NPS *Management Policies 2001*, sec. 1.4.3). The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the action (16 U.S.C. 1a-1). An action constitutes an impairment when its impacts “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS *Management Policies 2001*, sec. 1.4.4). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS *Management Policies 2001*, sec. 1.4.4). This environmental assessment, therefore, analyzes the effects of the management alternatives on park resources and values and determines if these effects would cause impairment.

NPS *Management Policies 2001* require an analysis of potential effects to determine whether or not actions would impair park resources (NPS 2001a). The fundamental purpose of the national park system is to conserve park resources and values for the use and enjoyment of future generations. NPS managers have the discretion to allow impacts on park resources and values when necessary and appropriate to

fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. That discretion to allow certain impacts within the park is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible manager, would harm the integrity of park resources or values. An impact on any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major adverse effect on a resource or value whose conservation is

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park,
- Key to the natural or cultural integrity of the park, and/or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

CODE OF FEDERAL REGULATIONS, TITLE 36 (1992)

Title 36, Chapter 1 provides the regulations “for the proper use, management, government, and protection of persons, property, and natural and cultural resources within areas under the jurisdiction of the National Park Service.” It states: “the National Park Service has the authority to manage the wildlife in the parks in fulfillment of the Organic Act without the consent of the state and by methods contrary to state law” (16 U.S.C. 3).

Code of Federal Regulations, Title 36, Section 2.13 Fires

Ground fires may be ignited and maintained seaward of the ocean dune below the high tide mark, but in no case less than 100 feet from a vegetated area. No ground fires are allowed in posted bird or turtle nest protection areas.

Code of Federal Regulations, Title 36, Section 2.15 (2) Pets

Pets shall be crated, caged, restrained on a leash which shall not exceed six feet in length, or otherwise physically confined at all times.

Code of Federal Regulations, Title 36, Section 2.38 Explosives

36 CFR 2.38(b) prohibits the use or possession of fireworks in all national parks.

Code of Federal Regulations, Title 36, Section 3.6 Prohibited Operations

Section 3.6 prohibits the launching of a vessel “propelled by machinery” from any location within the park other than a designated launch site.

Code of Federal Regulations, Title 36 Section 4.10 Travel on Park Roads and Designated Routes

This section states: “operating a motor vehicle is prohibited except on park roads, in parking areas and on routes and areas designated for off-road motor vehicle use.” Additionally, it states, “Routes and areas designated for off-road motor vehicle use shall be promulgated as special regulations. The designation of routes and areas shall comply with Section 1.5 of this chapter and Executive Order 11644 (37 FR 2887).”

NPS MANAGEMENT POLICIES 2001

Several sections from the NPS *Management Policies 2001* (NPS 2000a) are relevant to protected species management at Cape Lookout National Seashore, as described below.

NPS *Management Policies 2001* instruct park units to “maintain as part of the natural ecosystems of parks all native plants and animals by minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them” (NPS 2000a, 4.4.1).

The NPS *Management Policies 2001* directs park units to determine all management actions for the protection and perpetuation of federally, state, or locally listed species through the park management planning process, and to include consultation with lead federal and state agencies as appropriate. Sec. 4.4.2.3, Management of Threatened or Endangered Plants and Animals, specifically states:

The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. To meet these obligations, the Service will:

- Cooperate with both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to ensure that National Park Service actions comply with both the written requirements and the spirit of the Endangered Species Act. It is particularly important that this cooperation includes the full range of activities associated with the Endangered Species Act, including consultation, conferencing, informal discussions, and securing of all necessary scientific and/or recovery permits.
- Undertake active management programs to inventory, monitor, restore, and maintain listed species’ habitats, control detrimental non-native species, control detrimental visitor access, and re-establish extirpated populations as necessary to maintain the species and the habitats upon which they depend.
- Manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species.
- Cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits to the total recovery efforts being conducted by all the participating agencies.
- Participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate.
- Cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species.
- Conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.

DIRECTOR'S ORDER 12: CONSERVATION PLANNING, ENVIRONMENTAL IMPACT ANALYSIS, DECISION MAKING AND HANDBOOK

NPS Director's Order 12 and Handbook (NPS 2001a) lay the groundwork for how the NPS complies with the NEPA. Director's Order 12 and Handbook set forth a planning process for incorporating scientific and technical information and establishing a solid administrative record for NPS projects.

Director's Order 12 requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists. Director's Order 12 also requires that an analysis of impairment of park resources and values be made as part of the NEPA document.

DIRECTOR'S ORDER 77: NATURAL RESOURCE PROTECTION AND NATURAL RESOURCES MANAGEMENT GUIDELINES, NPS-77, 1991

Director's Order 77 addresses Natural Resource Protection, with specific guidance provided in the Natural Resource Management Reference Manual #77. This Reference Manual serves as the primary Level 3 guidance on natural resource management in units of the National Park System, replacing NPS-77, which was issued in 1991 under the previous NPS guideline series. The transition of NPS-77 into Reference Manual #77 is in progress. Some sections are still being revised, while others have undergone a field review with comments incorporated as applicable. Two sections that are complete include Director's Order 77-1: Wetland Protection, and Director's Order 77-2: Floodplain Management, and associated reference manuals; both of which were considered during the development of this interim protected species management plan/EA.

CAPE LOOKOUT NATIONAL SEASHORE PURPOSE AND SIGNIFICANCE

National park system units are established by Congress to fulfill specified purposes. A park's purpose is the fundamental building block for its decisions to conserve resources while providing for the "enjoyment of future generations."

As stated in the seashore's FY2000 Strategic Plan, the purpose and significance of Cape Lookout National Seashore is:

Purpose — The purpose of Cape Lookout National Seashore is to conserve and preserve for public use and enjoyment the outstanding natural, cultural, and recreational values of a dynamic coastal barrier island environment for future generations. The national seashore serves as both a refuge for wildlife and a pleasuring ground for the public, including the developed visitor amenities.

Significance — Cape Lookout National Seashore is nationally recognized as an outstanding example of a dynamic natural coastal barrier island system. The seashore is designated as a unit of the Carolinian-South Atlantic Biosphere Reserve, United Nations Educational, Scientific and Cultural Organizations (UNESCO) and Man and the Biosphere Reserve Program. The park contains cultural resources rich in the maritime history of humankind's attempt to survive at the edge of the sea. Cape Lookout National Seashore contains critical habitat for endangered and threatened species and other unique wildlife including the legislatively protected wild horses of Shackleford Banks. The park also represents a conscious change/control in the human use/development of the island.

The seashore's enabling legislation (Act of March 10, 1966 (16 USCS Section 459)) also states this purpose and significance as: "In order to preserve for public use and enjoyment an area in the State of North Carolina possessing outstanding natural and recreational values, there is hereby authorized to be established the Cape Lookout National Seashore."

CAPE LOOKOUT NATIONAL SEASHORE PLANNING DOCUMENTS

The purpose, need, and objectives need to be, to a large degree, consistent with park planning documents. These include the 1966 Enabling Legislation, the 2000 Strategic Plan, the 1980 General Management Plan (GMP), the 2001 GMP Amendment and Environmental Assessment, the annual Superintendent's Compendium, and various cultural and natural resource management documents.

Enabling Legislation

The seashore's 1966 *enabling legislation* includes provisions for hunting and fishing and outdoor recreation and enjoyment. These provisions are:

§ 459g-3. Hunting and Fishing Provisions: The Secretary shall permit hunting and fishing, including shellfishing, on lands, marshlands, and waters under his jurisdiction within the Cape Lookout National Seashore in accordance with the laws of the State of North Carolina and the United States, to the extent applicable, except that the Secretary may designate zones where, and establish periods when, no hunting or fishing shall be permitted for the reasons of public safety, administration, fish or wildlife management, or public use and enjoyment. Except in emergencies, any rules and regulations of the Secretary pursuant to this section shall be put into effect only after consultation with the North Carolina Wildlife Resources Commission and the North Carolina Department of Conservation and Development.

§ 459g-4. Administration; Public Outdoor Recreation and Enjoyment; Utilization of Authorities for Conservation and Development of Natural Resources: (a) The Secretary shall administer the Cape Lookout National Seashore for the general purposes of public outdoor recreation, including conservation of natural features contributing to public enjoyment. In the administration of the seashore and the administrative site, the Secretary may utilize such statutory authorities relating to areas administered and supervised by the Secretary through the National Park Service and such statutory authorities otherwise available to him for the conservation and management of natural resources as he deems appropriate to carry out the purposes of this Act [16 USCS §§ 459g et seq.].

2000 Strategic Plan, Fiscal Years 2000 – 2005

The Strategic Plan addresses topics such as the mission of Cape Lookout National Seashore and goals for accomplishing and maintaining the mission. Strategies for achieving these goals are discussed, as well as long-term goals for the five-year period covered in the plan. The Mission Statement for the seashore, as stated in the Strategic Plan, is “to conserve and preserve for the future the outstanding natural resources of a dynamic coastal barrier island system; to protect and interpret the significant cultural resources of the past and contemporary maritime history; to provide for public education and enrichment through proactive interpretation and scientific study; and to provide for sustainable use of recreation resources and opportunities.” Mission goals of the park addressed in the Strategic Plan fall under the following categories:

1. Preserve park resources.
2. Provide for the enjoyment and visitor experience of the park.
3. Ensure organizational effectiveness.

1980 GENERAL MANAGEMENT PLAN

The 1980 GMP provides an outline of park-wide planning for addressing management objectives. This GMP was amended in 2001.

2001 Cape Lookout National Seashore Amendment to General Management Plan and Environmental Assessment

The amendment focused on possible improvements to overnight accommodations and transportation services for persons visiting North Core Banks (excluding the Portsmouth Island area) and South Core Banks at Cape Lookout National Seashore. In summary, the Finding of No Significant Impact (FONSI) proposed that the NPS:

- Negotiate long-term contracts with concessionaires to transport visitors and vehicles from the towns of Davis, North Carolina and Atlantic, North Carolina to Great Island and Long Point, both sites on the Core Banks, Cape Lookout National Seashore, North Carolina;
- Improve overnight accommodations by removing old cabins at Great Island and constructing 30 new cabins;
- Add 10 new cabins at Long Point;
- Improve relationships with incidental business permittees by issuing biennial business permits to small craft operators that provide transport services to visitors to Cape Lookout Keepers' Quarters area;
- Reduce the number of parking spaces near the Keepers' Quarters; and
- Develop an ORV plan.

Under the GMP Amendment, mission goals for "Preserve Park Resources" are:

- Natural and cultural resources and associated values are protected, restored, and maintained in good condition, and managed within their broader ecosystem and cultural context. This goal includes natural and cultural resources at the national seashore. Long-term goals relate to protecting, restoring, and maintaining natural areas, threatened and endangered species, archeological sites, and historic structures and objects.
- Cape Lookout National Seashore contributes to knowledge about natural and cultural resources and associated values; management decisions about resources and visitors are based on adequate scholarly and scientific information. Park managers must be able to use scholarly and scientific information to ensure that decisions will not adversely affect the national seashore's resources.

Under the general category of "Provide for Public Enjoyment and Visitor Experience," the national seashore has developed the following mission goals:

- Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of Cape Lookout National Seashore's facilities, services, and appropriate recreational opportunities. Visitors must be able to enjoy and experience the seashore safely. Accessibility for special populations must be provided, where appropriate. Diversity and quality of the national seashore's facilities, services, and recreational opportunities must be considered for all visitors without being harmful to park resources or inconsistent with the national seashore's purpose and philosophy.
- Seashore visitors and the general public understand and appreciate the preservation of Cape Lookout National Seashore and its resources for this and future generations. A better understanding of the purpose of what makes the park special enhances the national seashore's visitor's experience. In addition, neighbors in surrounding communities understand and appreciate the preservation of the national seashore's resources for this and future generations.

Superintendent's Compendium

Annual compendiums are composed by park superintendents to detail specific regulations applicable to a variety of topics within park units. The current Cape Lookout National Seashore Superintendent's

RELATED LAWS, POLICIES, PLANS, AND ACTIONS

Compendium outlines regulations relevant to the use of all terrain vehicles, beach closures, boat and personal watercraft use, swimming, and public use limits, including those related to species management closures.

OTHER SEASHORE PLANS, POLICIES, AND ACTIONS

Commercial Services Plan

The Commercial Services Plan will address the need for and desirability of a variety of visitor services provided by commercial enterprises, including such items as ferry operations, cabin rental, land transportation services, rentals, and concession food and supplies. This plan is scheduled for completion in 2007.

Comprehensive Interpretive Plan

A Comprehensive Interpretation Plan for Cape Lookout National Seashore is planned for development. This plan will articulate the park's purpose, significance, and themes and is necessary to inform/guide the park's interpretive and education programs.

Horse Management Plan

The current Horse Management Plan is being updated. This plan defines how both the NPS and the Foundation of Shackleford Horses cooperatively manage the culturally significant feral horse population on Shackleford Banks.

Cape Lookout Village Historic Structure Reuse Implementation Plan/EA

This ongoing planning and environmental assessment was required as result of litigation. This plan addresses future reuse of structures within the Cape Village Historic District.

Harkers Island and Cape Lookout Keepers' Quarters Exhibit Plan

This project involves exhibit planning and design for new exhibits. The Harkers Island exhibits will orient visitors to the breadth of resources and recreational opportunities within the park. The Keepers' Quarters exhibits will orient visitors to the cape area and interpret the history of the lighthouse complex and associated historic resources.

Wayside Exhibit Plan

This project involves exhibit planning, design, and implementation for outdoor orientation exhibits that will be placed at most major visitor departure and arrival areas (generally, ferry landings). In addition to providing orientation to the breadth of park resources, the exhibits will provide safety and regulatory information. Some of the wayside exhibits will provide specific interpretive explanation of park resources.

Stabilization of Historic Structures Project/EA

An EA was prepared to determine impacts of adding sand to the shoreline for protection of historic structures at the Cape Lookout Lighthouse. This project will begin in early March 2006, with a scheduled completion date of late March 2006.

Visitor Use Study

A visitor use study is proposed at Cape Lookout to provide data to help develop the long-term ORV management plan/EIS for Cape Lookout National Seashore. Over a course of 2 years, both observational and survey data will be collected to determine the types, levels, distribution, and movement patterns of ORVs within the seashore, including the impact of their use on visitor experiences. Methods used for this project will include systematic counts of ORVs throughout the seashore, mechanical traffic counters, and a visitor survey. Primary purposes of this study include determining: (1) the level, character, and pattern

of ORV use throughout the seashore; (2) visitor norms and attitudes toward ORV use at Cape Lookout National Seashore; and (3) visitor preferences/support for ORV management alternatives that may be necessary to mitigate undesirable conditions. A secondary outcome will be the development of a profile of seashore visitors.

The objectives of this study will be met through a variety of methods including: (1) counts of visitors and ORVs throughout the park; (2) mapping numbers and locations of visitors and ORVs throughout the park; (3) observing and recording the number of visitors per vehicle; (4) obtaining data on the number of vehicles and visitors delivered to the seashore by licensed ferry operators; (5) observing and recording what activities visitors participate in at key areas within the park; (6) and use of both on-site and mail-back surveys completed by a sample of visitors to the park. The data collection phase of this study will continue for 2 years. It is anticipated that a portion of the first year of data collection will be devoted to determining the best and most efficient methodology and sampling strategy. Data collection will be conducted based on a sampling plan developed in cooperation with Seashore personnel, project personnel, and first year trials. This plan will reflect current visitor/ORV distribution knowledge, the diversity of the seashore's landscape, data derived from the Cape Hatteras National Seashore Visitor Use Study, and seasonal visitor use changes. One major objective of this project is to determine visitor attitudes, preferences, and norms toward park resources, other visitors, and ORV use. This will be accomplished through on-site and mail-back surveys designed to gather information from a variety of park users.

Concessionaires and Ferry Operations

Limited concessionaire services are offered on Cape Lookout National Seashore including cabin rentals and a limited beach shuttle/taxi service. The beach shuttle service concession operates on North Core Banks and South Core Banks and offers four-wheel drive shuttle service from their area of operation. At the lighthouse area on South Core Banks, shuttle services operated by Incidental Business Permittees run from the lighthouse area to Cape Point and may also include a historical tour. Concessionaire provided cabins are located on Cape Lookout National Seashore's North Core Banks and South Core Banks; reservations are required. Some of the cabins have running water and generator-provided electricity. Concessionaires provide limited supplies such as ice and gasoline. No food services are available on the seashore.

Public access to the seashore is by private boat or concessionaire-operated ferry only. Several IBP-operated passenger-only ferries link points in Carteret County and Hyde County with Cape Lookout National Seashore. A ferry runs between Ocracoke and Portsmouth Village on the North Core Banks. Several other ferries link Harkers Island and Beaufort with the Cape Lookout Lighthouse on the South Core Banks and Shackleford Banks. An IBP ferry service also links Morehead City with Shackleford Banks. IBP ferries generally operate on a regular basis from April to November and a more limited schedule during the winter months.

Two concessionaire-operated vehicle and passenger ferries enable the public to transport their vehicles to the Cape Lookout National Seashore. One ferry service runs between Atlantic and Long Point on North Core Banks. A second ferry service links Davis with Great Island on South Core Banks. Public vehicles are not authorized on Shackleford Banks and vehicle ferry service is not available. These ferries also operate on a regular basis from April to November, on a more limited schedule during December, and are generally closed from January until mid-March or April.

Hurricane Recovery

Located along the coast of North Carolina, Cape Lookout National Seashore is subject to hurricane events of varying severity on an annual basis. During and after these events, park staff can be diverted from regular activities, such as resource management, to further hurricane recovery efforts throughout the seashore.

Storm and Other Weather Events

Storms and other weather events, part of the dynamic Cape Lookout ecosystem, must be factored into any planning efforts that occur at the seashore. A single storm event can dramatically change the face of the landscape at the seashore, and any management measure put into place should be adaptive to the changing environment.

OTHER FEDERAL LAWS, EXECUTIVE ORDERS, REGULATIONS, AND POLICIES

The NPS is required to comply with the following laws, Executive Orders, regulations, and policies in developing its interim protected species management plan/EA.

National Environmental Policy Act of 1969, as Amended (NEPA)

NEPA is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500-1508). The NPS has in turn adopted procedures to comply with the act and the CEQ regulations, as found in Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (2001), and its accompanying handbook.

National Parks Omnibus Management Act of 1998 (NPOMA)

NPOMA (16 U.S.C. 5901 et seq.) underscores NEPA in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both acts also recognize that such data may not be readily available and provide options for resource impact analysis in this case.

NPOMA directs the NPS to obtain scientific and technical information for analysis. The NPS handbook for Director's Order 12 states that if "such information cannot be obtained due to excessive cost or technical impossibility, the proposed alternative for decision will be modified to eliminate the action causing the unknown or uncertain impact or other alternatives will be selected" (*NPS Management Policies 2001*, section 4.4).

Redwood National Park Act of 1978, as Amended

All National Park System units are to be managed and protected as parks, whether established as a recreation area, historic site, or any other designation. This act states that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

Endangered Species Act of 1973, as Amended

This act requires all federal agencies to consult with the Secretary of the Interior and/or Commerce on all projects and proposals with the potential to impact federally endangered or threatened plants and animals. "Take," as it applies to the Endangered Species Act and as stated in the Act at § 3.19, means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. "Harass" is defined by the USFWS as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The USFWS further defines "harm" to include significant habitat modification or degradation that results in death to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). The NPS is currently in consultation with the USFWS and has submitted a Biological Assessment for its review.

Migratory Bird Treaty Act of 1918

While the Endangered Species Act, 16 U.S.C. §§ 1531, *et seq.*, protects only species listed as endangered or threatened, the Migratory Bird Treaty Act protects all migratory birds and their nests from direct harm.

Section 703(a) provides that “it shall be unlawful at any time, by any means or in any manner, to...take...any migratory bird, any part, nest, or egg of any such bird” that is protected under the migratory bird treaties to which the United States is a party. The implementing regulations define a “take” as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” In construing the Migratory Bird Treaty Act, the courts have held that the Act’s “taking” prohibition does not apply to habitat modification. *Citizens Interested in Bull Run, Inc. v. Edrington*, 781 F. Supp. 1502 (D. Ore. 1991); *Mahler v. United States Forest Service*, 927 F. Supp. 1559 (S.D. Ind. 1996); *Seattle Audubon Society v. Evans*, 952 F.2d 297 (9th Cir. 1991). While habitat destruction that indirectly causes the death of migratory birds or the destruction of their nests does not constitute a taking within the meaning of the Migratory Bird Treaty Act, the Act does prohibit the direct, though unintended, taking of protected migratory birds and/or nests. *Seattle Audubon Society*, 952 F.2d at 303. With respect to Cape Lookout National Seashore, ORV use that modifies migratory bird habitat is not prohibited by the Migratory Bird Treaty Act. However, the Migratory Bird Treaty Act prohibits ORV use that directly, yet unintentionally, kills migratory birds or destroys their nests and/or eggs.

Although the Migratory Bird Treaty Act is a criminal statute, courts have held that section 703 does impose restrictions on federal agencies. In *Humane Society of the United States v. Glickman*, 217 F.3d 882 (D.C. Cir. 2000), the D.C. Circuit noted that defendants were “quite mistaken in supposing that § 703 could not be enforced against federal agencies except through the criminal provision contained in § 707 (a),” and held that “the fact that the Act enforced a treaty between our country and Canada reinforces our conclusion that the broad language of § 703 applies to actions of the federal government” *Id.* at 886-887. Similarly, the D.C. district court in *Center for Biological Diversity v. Pirie*, 191 F. Supp. 2d 161 (D.D.C. 2002), reaffirmed the Migratory Bird Treaty Act’s application to federal agencies and held that “[t]he language of [section 703 making it unlawful to take or kill any migratory bird] is unequivocal” and “applies with equal force to federal agencies” *Id.* at 173.

These cases indicate that NPS is subject to the restrictions set forth in the Migratory Bird Treaty Act. Because NPS has a duty under the Act to protect migratory shorebirds from illegal takings, NPS may be liable for violations of the Migratory Bird Treaty Act if it permits ORV use that directly kills or takes migratory birds and/or migratory bird nests or eggs at the seashore, since such action would be “otherwise not in accordance with the law” under the Administrative Procedure Act. 5 U.S.C. § 706. *Pirie*, 191 F. Supp. 2d at 175 (holding that a federal agency may be sued under the Administrative Procedure Act for violations of the Migratory Bird Treaty Act).

Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds

The NPS has an obligation to protect migratory shorebirds at Cape Lookout National Seashore pursuant to Executive Order 13186, which directs federal agencies “taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations,” to “develop and implement...a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service that shall promote the conservation of migratory bird populations” (66 Fed. Reg. 3853, 3854 January 17, 2001). Pursuant to its MOU, each agency shall, among other things, avoid or minimize adverse impacts on migratory bird resources, which include both migratory birds and the habitats upon which they depend, (*Id.* at 3853), “design migratory bird habitat and population conservation principles, measures, and practices, into agency plans and planning processes as practicable” (*Id.* at 3854), and “ensure that environmental analyses of federal actions required by the NEPA or other established review processes evaluate the effects of actions and agency plans on migratory birds” (*Id.* at 3855). This Executive Order thus imposes upon the NPS an affirmative obligation to protect migratory birds as well as their habitats. The NPS must take into account this obligation when engaging in agency action that may adversely impact migratory birds.

OTHER FEDERAL ACTIONS

Other federal actions must be considered when assessing implementation of an interim protected species management plan/EA. The following details other federal actions.

Beaufort Inlet Dredging

Beaufort Inlet separates Shackleford Banks from Atlantic Beach and Fort Macon and serves as an entrance to Beaufort Harbor, one of North Carolina's major deep-water ocean ports. Dredging of the inlet's main navigational channel routinely takes place.

Oregon Inlet Dredging

Periodically the U.S. Army Corps of Engineers undertakes maintenance dredging to the Oregon Inlet Channel between Bodie and Hatteras Islands to remove sand deposited in the channel since the previous dredging. The turbulent inlet requires regular dredging to maintain a safe navigation channel. The existing Bonner Bridge, which crosses Oregon Inlet, has two navigation spans thus requiring the navigation channel to line up with these spans for safe navigation. Spoil from dredging of Oregon Inlet is used for berm maintenance to protect North Carolina Route 12, for replenishment of Pea Island National Wildlife Refuge beaches, and for berm maintenance adjacent to village enclaves at Cape Hatteras National Seashore.

Military Overflights

Department of the Navy (Navy) is proposing to construct an outlying landing field (OLF) in Eastern North Carolina and to designate approximately 900 square miles of new Military Operations Area (MOA) airspace associated with OLF, including a 3 by 35 nautical mile area over Cape Lookout National Seashore (Core MOA). The Navy would use the Core MOA for high-speed travel between the Atlantic Ocean and existing military space over the Pamlico Sound. The new landing field itself would not be in close proximity to Cape Lookout National Seashore, but would lie within 5 miles of the Pocosin Lakes National Wildlife Refuge, the winter home for nearly 100,000 waterfowl. In 2002, the Navy completed a Draft Environmental Impact Statement on the proposed OLF cites and associated MOAs. In September 2003, the Navy issued a Record of Decision (ROD) setting forth its preferred alternative, including the establishment of the Core MOA. Environmental groups concerned with the close proximity of the landing field to the Pocosin Reserve challenged the action, charging that the Navy had failed to aptly conduct a "hard look" at an array of potential environmental impacts as required under NEPA. The district court found that the Navy failed to adequately consider the cumulative impacts of establishing the Core MOA and establishing operations at the newly constructed OLF. The Fourth Circuit Court of Appeals, while upholding a majority of the district court's findings as to the Navy's NEPA deficiencies, nevertheless reversed its decision in regard to the Core MOA. Here, it accepted the Navy's conclusion that since the MOA would be established more than 30 nautical miles south of the nearest OLF siting alternative, there would be no cumulative impacts that would warrant NEPA consideration. Neither the district court decision, nor the circuit court decision on appeal, spoke to the potential effects the Core MOA would have to resources at Cape Lookout National Seashore. The Navy is now under a court order to revisit the EIS.

Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA and Long-term ORV Management Plan/EIS.

Located north of Ocracoke Inlet, Cape Hatteras National Seashore is also developing an interim protected species management strategy/EA. Cape Hatteras National Seashore's interim protected species management strategy/EA will guide management practices for the protection of special status species occurring at the seashore until a long-term ORV management plan/EIS and regulation is developed.

Cape Hatteras National Seashore is also developing a long-term ORV management plan/EIS. This plan/EIS is being developed during the same time frame as the Cape Lookout National Seashore long-term ORV management plan/EIS and will cover similar issues. Executive Orders 11644 and 11989 require the plans.

STATE AND LOCAL LAWS, REGULATIONS, AND POLICIES

North Carolina Wildlife Resources Commission Nongame and Endangered Wildlife Program

The Nongame and Endangered Wildlife Program, established in North Carolina in 1983, aims to prevent species from becoming endangered through maintaining viable, self-sustaining populations of all native wildlife, with an emphasis on species in decline. The North Carolina Wildlife Resources Commission has a Comprehensive Wildlife Strategy to protect state-listed species. This plan includes securing funding for state fish and wildlife agencies to take preventive actions that help keep rare species from becoming endangered and keep common species common (NCWRC nd). Some species listed through this program as state threatened, endangered, or of special concern were included in this plan/EA. Endangered and threatened wildlife and wildlife species of special concern are protected under Article 25 of Chapter 113 of the North Carolina General Statutes. The species addressed include those that typically use areas also popular to visitors for foraging, nesting, and/or wintering habitat.

The North Carolina Wildlife Resources Commission is responsible for publishing the *Handbook for Sea Turtle Volunteers in North Carolina*. The handbook provides guidance to volunteers in conducting biologically sound management projects to benefit sea turtles and to help ensure compliance with laws pertaining to rare and endangered species at all levels of government. This guidance also provides species descriptions to aid volunteers. The management measures set forth in the handbook were taken into consideration during the development of this plan/EA. An annual permit is issued by the North Carolina Wildlife Resources Commission under the authority of the U.S. Fish and Wildlife Service and USFWS Recovery Plans as referenced in NPS 2006.

North Carolina Coastal Area Management Act

The North Carolina Coastal Area Management Act establishes a cooperative program of coastal area management between local and state governments through comprehensive planning for the protection, preservation, orderly development, and management of the coastal area of North Carolina. The Coastal Area Management Act program was federally approved in 1978 and is the state's coastal zone management program under the Coastal Zone Management Act. Localities are responsible for planning while the state establishes areas of environmental concern. As a part of this program, the Coastal Resources Commission designated "Areas of Environmental Concern" in the 20 coastal counties and set rules for managing development in these areas. An Area of Environmental Concern is an area of natural importance that may be easily destroyed by erosion or flooding or that may have environmental, social, economic, or aesthetic values that make it valuable to North Carolina.

Federal agencies proposing an activity within an Area of Environmental Concern must submit a "consistency determination" to the North Carolina Department of Coastal Management. For example, if the National Park Services proposes to install a shoreline protective device at Cape Lookout National Seashore, then NPS is required to submit a consistency determination documenting how the proposed activity would be considered consistent with the State's coastal program. The NPS has submitted a consistency determination for this project and is awaiting the state's letter of concurrence or objection.

North Carolina State Motor Vehicle Regulations

Title 36 §4.2 of the Code of Federal Regulations requires that state law, unless otherwise specified, govern traffic and use of vehicles in all national parks. In addition to motor vehicle provisions of Title 36 Code of Federal Regulations, Cape Lookout National Seashore assimilates and enforces North Carolina State motor vehicle regulations. Except as modified by 36 CFR or the Superintendent's Compendium these state regulations are the basis for enforcement actions with respect to traffic regulation and enforcement actions on the seashore. The seashore has concurrent jurisdiction with the state and enforces state regulations both on seashore beaches and vehicle access roads as well as on state highways within the boundaries of the seashore.

RELATED LAWS, POLICIES, PLANS, AND ACTIONS

STATE AND LOCAL ACTIONS

Carteret County Comprehensive Plan

The Carteret County Comprehensive Plan provides policies and programs to promote continued quality of life and a sustainable development pattern over a 20-year period. Goals and objectives are set out for economic development, education, the environment, health care, quality of life, recreation, cultural, and natural resources, regional relations, and transportation.

Alternatives

ALTERNATIVES

The National Environmental Policy Act (NEPA) requires that federal agencies develop a range of reasonable alternatives and provide an analysis of what impacts the alternatives could have on the natural and human environment. The alternatives under consideration must include a “no-action” alternative as prescribed by 40 Code of Federal Regulations (CFR) 1502.14. The no-action alternative in this *Interim Protected Species Management Plan/Environmental Assessment* (plan/EA) is the continuation of current management of the seashore’s protected species, and it assumes that the National Park Service (NPS) would not make major changes to current management.

The three action alternatives presented in this chapter were derived from the recommendations of an interdisciplinary planning team and through feedback from the public during the public scoping process. The interdisciplinary planning team comprises NPS resource specialists from the Washington Office, Environmental Quality Division, the Southeast Regional Office, the seashore, and the private contractor working with the NPS on the plan/EA.

The action alternatives provide specifically for the following species:

- federally threatened piping plover (*Charadrius melodus*)
- federally listed sea turtles that nest in the seashore:
 - threatened loggerhead (*Caretta caretta*)
 - threatened green turtle (*Chelonia mydas*)
 - endangered leatherback turtle (*Dermochelys coriacea*)
- federally threatened seabeach amaranth (*Amaranthus pumilus*)
- state-listed threatened species and species of special concern:
 - common tern (*Sterna hirundo*)
 - least tern (*Sterna antillarum*)
 - gull-billed tern (*Sterna nilotica*)
 - black skimmer (*Rynchops niger*)
- U.S. Shorebird Conservation Plan Species of high concern or highly imperiled
 - American oystercatcher (*Haematopus palliatus*)
 - Wilson’s plover (*Charadrius wilsonia*)
 - red knot (*Calidris canutus rufa*)

The management of endangered and threatened species is mandated by law and should be based on the best available information, including published research, reports, and the practical experience of scientists and seashore resource managers. All of these sources, along with public input, were consulted and formed the basis of the alternative management actions. Management guidance or scientific references were gleaned from a number of sources, including the following documents that can be accessed through the NPS Planning, Environment and Public Comment (PEPC) website for this project (<http://parkplanning.nps.gov/CALO>).

ALTERNATIVES

- Piping Plover (*Charadrius melodus*) Atlantic Coast Population Revised Recovery Plan. U.S. Fish and Wildlife Service. 1996.
- Technical/Agency Review Draft, Revised Recovery Plan for Piping Plovers, *Charadrius melodus*, Breeding on the Great Lakes and Northern Great Plains. U.S. Fish and Wildlife Service. 1994.
- Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). U.S. Fish and Wildlife Service. 2003.
- Recovery Plan for Seabeach Amaranth (*Amaranthus pumilus*). U.S. Fish and Wildlife Service. 1996.
- Waterbird Conservation for the Americas: North American Colonial Waterbird Conservation Management Plan. Kushlan, James et al. 2002.
- Handbook for Sea Turtle Volunteers in North Carolina. North Carolina Wildlife Resources Commission. 2002.
- Recovery Plan for U.S. Population of Loggerhead Turtle (*Caretta caretta*). U.S. Fish and Wildlife Service. 1991.
- Recovery Plan for U.S. Population of Atlantic Green Turtle (*Chelonia mydas*). U.S. Fish and Wildlife Service. 1991.
- Recovery Plan for the Leatherback Turtles in the US. Caribbean, Atlantic, and Gulf of Mexico (*Dermochelys coriacea*). U.S. Fish and Wildlife Service. 1992.

The range of reasonable alternatives selected for detailed analysis in the environmental assessment must meet the management objectives of the seashore to a large degree, while also meeting the purpose of and need for action. Reasonable alternatives:

- are within stated constraints, including existing law and NPS policies
- should each minimize impacts on all or several resources
- are economically feasible (but not necessarily the cheapest or easiest solution)
- display common sense
- meet the objectives of taking action
- are technically feasible

In addition to the no action (continuation of current management) alternative A, three other alternatives are analyzed in detail in this environmental assessment. See the “Alternatives Considered but Rejected” section at the end of this chapter for a discussion of those alternatives that the NPS considered but eliminated from further detailed analysis in this document. Some of these may be appropriate for detailed analysis in the long-term off-road vehicle (ORV) management plan/environmental impact statement (EIS).

The following is an overview of the alternatives selected for detailed analysis; detailed descriptions of each alternative follow at the end of this chapter in the alternatives summary tables (“Table 1: Alternatives Elements Summary—Species Survey and Management” and “Table 2: Alternatives Elements Summary—Recreation and Other Seashore Management”). The alternatives elements summary tables are designed to point out how the alternatives differ from each other and highlight when actions vary for different species. For bird species, the alternatives description and the summary tables illustrate how actions change with the specific life stages of each species. The alternatives are organized in this way to reflect that the biological needs and, hence, the management needs of each species change dramatically as a function of life stage. The life stages include:

- **Pre-nesting**—The time when first-time and established breeding birds select habitat for courtship and nesting and try to attract a mate. Birds are highly territorial at this time and particularly vulnerable to disturbance. This is the life stage when risk of abandonment of a site is the highest.
- **Courtship/mating** (includes territory establishment)—Similar to pre-nesting as courtship, mating and territorial establishment are all part of pre-nesting/egg-laying.
- **Nesting**—Incubation typically begins when the clutch (eggs) is complete and, while abandonment is still a risk, especially early in incubation, the risk that birds will abandon declines as incubation time increases. Essentially, the more invested the birds are in their nest and eggs, the less likely they are to abandon a clutch. Typically, older, more established birds are more tolerant of disturbance than first-time breeding birds.
- **Unfledged chicks**—The life stage when chicks are highly mobile but have yet to develop enough to leave the care of their parents and the nest.
- **Non-breeding/wintering activity**—Migration support and the high energy demands of migrating or surviving in winter means that birds need to be mobile and provided with opportunities for efficient food-finding.

The timing of each life stage varies according to the species in question; however, there is much overlap among species. For example, surveying for piping plover would occur at the same time as surveying for colonial waterbirds. In addition, there would likely be overlap among the established closures, as the preferred habitat is similar between similar species (e.g., piping plover and Wilson’s plover). Therefore, some closures would likely occur at the same time and in the same place for multiple species.

Under each of the alternatives, species management may include the designation of buffers of various sizes around sensitive species and their habitats to protect them from disturbances and intrusions. These buffers are then implemented by the establishment and delineation of closures around and including these buffers to keep ORVs and/or other recreational users out of the buffer zones. The closures are one of two types:

- **ORV Closures**—in these areas, ORV use is prohibited, but other recreational users such as pedestrians and leashed pets are allowed.
- **Full Recreational Closures**—in these areas, all recreational users are prohibited, including pedestrians, their pets, and ORVs.

Generally, closures that are established to protect sensitive bird species are full recreational closures, since pedestrians and other non-vehicular users can disrupt nesting and other life stages. On the other hand, closures that are established to protect areas with sea turtle nests are generally ORV closures (with a small area immediately around the nest closed to all recreational use), since pedestrian use in these areas can occur without adverse impacts.

Just because closures have been established along the beach does not mean that the entire beach would be blocked or that visitors or ORVs could not pass around the closures. For example, a closure associated with a 150-foot buffer designated for protection of piping plover nests would generally mean that pedestrians or ORVs could pass around the closed area, assuming that sufficient beach area exists (see figure 3). However, if this closure becomes extended to 600 feet in a section of beach with unfledged piping plover chicks, then the entire section of beach could fall within the closure area, and no recreational access would be allowed in this area. In this case, pedestrians would follow a path around the closures, and ORVs would be routed around the area using access ramps and the backroad. This situation would not be common, but could occur during a period of up to 2 to 4 weeks during the summer months when chicks are foraging along the beach. This would also be the case when ORV closures extend from the dunes into the water to protect nesting turtles. In this case, ORVs would need to be routed to the backroad, but pedestrians would be permitted along the beach.

In addition to closures that are established for protection of species, there are a few areas closed year-round to ORVs at Cape Lookout National Seashore. These include: Shackleford Banks, Power Squadron Spit, Portsmouth Flats, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B. These permanent ORV closures do not change from alternative to alternative. There are currently no year-round full recreational closures at the seashore; however, a seasonal full recreational closure at the north end of South Core Banks is proposed in alternative B.

All closures are delineated using posts, signs, or a combination of these, often with yellow rope strung between the posts to form a symbolic fence.

At the end of this chapter, table 3 compares how each of the alternatives described in this chapter would meet the objectives. The “Environmental Consequences” chapter describes the effects on each impact topic under each of the alternatives, including the impact on recreational values and visitor experience. These impacts are summarized in table 4.



FIGURE 3: CLOSURE AREA WITH 150-FOOT BUFFERS

ALTERNATIVE A: NO-ACTION ALTERNATIVE, CONTINUATION OF CURRENT MANAGEMENT

Regulations from the Council on Environmental Quality (CEQ) 40 CFR 1502.14(d) require that the alternatives analysis in an EA must “include the alternative of no action.” The no-action alternative “sets a baseline of existing impact continued into the future against which to compare impacts of action alternatives” (Director’s Order 12, Section 2.7). Under the no-action alternative, protected species management at the seashore would be a continuation of current management.

Species management includes designation of buffer zones around sensitive resources and the delineation of closures around and including these buffers. Buffers and their associated closures are generally established based on species behavior and/or conditions on the ground.

SPECIES SURVEYING AND MANAGEMENT

To minimize human disturbances, seashore rangers and biologists would continue to seasonally protect sections of beach used by colonial and solitary nesting birds. Seashore employees would survey nesting areas used by the birds during the previous breeding season every 2 to 3 days each week depending upon the species. A range of observations would occur for bird species across pre-nesting, nesting, migration, and over-wintering life stages and include such things as observing piping plover adults, scrapes, nests, eggs, broods, and chicks as well as adult and juvenile piping plovers in migration or on their wintering ground.

In alternative A, piping plover active nesting areas (those areas used the previous breeding season) would be closed to all recreational use, using symbolic fencing and standard seashore “Bird Sanctuary” signs beginning in April of each year. American oystercatcher breeding areas on North Core Banks and South Core Banks would be observed, but active nesting areas would not be posted or closed. Colonial waterbird active nesting areas would be closed to all recreational use beginning April 15. Similarly, tern and skimmer historic habitat would be closed to all recreational use by April 15. The presence of territorial or courting birds outside of existing closures could further extend these initial closures. Under alternative A, Wilson’s plover would continue to not be actively managed.

When nests are found, seashore staff would record bird location, status of nest, number of eggs, bird behavior, and evidence of predators; the degree of information collected would depend on the species. Surveys would continue to be conducted with optical equipment from an appropriate distance to prevent disturbance to the birds. If piping plover and/or colonial waterbird nests were found, a 150-foot buffer would be designated and maintained. American oystercatcher nests would continue to be marked, except in the dunes, and provided a buffer and associated full recreational closure of 10 square feet if the nest is in a pedestrian or ORV use area. Some closures may be expanded when nests or nest scrapes are found in new areas. Any recreational use, including ORVs, would be allowed along the oceanside shoreline outside of these closure areas as long as the 150-foot buffer could be maintained around an active piping plover nest.

Staff would continue to place predator exclosures over piping plover nests when they contain 3 to 4 eggs.

When piping plover chicks hatch and leave the nest to forage on the beach, a 600-foot ORV buffer and associated closure would be established around the brood. ORV use would be routed to the backroad. If no backroad is available, an escort program could be initiated through a piping plover closure. For American oystercatcher, ramp-to-ramp ORV closures would be used after nests hatch if a backroad route is available. If not, signs regarding flightless birds would be posted through American oystercatcher closures and ORVs would be allowed at 15 mph. Vehicles would be routed around colonial waterbird closures, except at the interior of Cape Lookout Point, which would be closed to ORVs. Bird closures would be lifted once the last chick is fledged or lost, except closures at Shackleford Banks, Portsmouth

Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. Wintering and migrating habitat for the piping plover would be surveyed once per month and coordinated with Cape Hatteras National Seashore.

Cape Lookout National Seashore would continue to follow management guidelines defined by the North Carolina Wildlife Resources Commission (NCWRC) in its Handbook for Sea Turtle Volunteers in North Carolina (2002) and the U.S. Fish and Wildlife Service Index Nesting Beach Survey Protocol. An annual permit is issued by NCWRC under the authority of the U.S. Fish and Wildlife Service. Before June 1, seashore staff conducting piping plover surveys would note any turtle crawls (tracks left by turtles when they come ashore to nest) and nests. From June 1 to August 15, beaches would be patrolled in search of turtle crawls daily on South Core Banks and North Core Banks; 2 to 3 days per week on Shackleford Banks; and irregularly on Middle Core Banks because of the difficult access. Nests would be documented by patrols surveying the beaches before 12:00 PM each day.

Nests would continue to be left in place or relocated for environmental reasons. Nest relocation would be confined to nests that might be threatened with loss by erosion or frequent overwash. Nests would be relocated within 12 hours after the eggs are laid or 14 days after the nest was laid, and placed in one of three nest relocation areas designated on South Core Banks and North Core Banks. Within these areas, ORV traffic would be prohibited beginning 50 days after the first nest is relocated.

Any single nest left in place, or relocated, would be marked with four stakes: two white PVC stakes with orange reflector tape 5 feet apart spanning the nest and two wooden stakes at the primary dune line. At 50 days into incubation, a funnel-shaped ORV closure, 30-feet wide at the nest and 60-feet wide at the base, would continue to be erected from the nest to 15 feet below the high tide line. A minimum buffer of 10 feet would be provided duneward of the nest. If a buffer is not possible, then the full beach would be closed to ORV access from the two nearest ramps and vehicles would be routed to the backroad. Nests would be excavated following a major hatch, 10 days after a depression forms, or 75 days after the nest was laid if there is no sign of hatching. ORV closures would be removed following nest excavation if the nest is outside the relocation areas. Screens or cages would be placed over the nests to protect them from predation. Nests vulnerable to light pollution would be protected with plywood barriers behind and to the sides of the nest 10 days before hatching.

Staff would continue to conduct annual surveys in late-July or early-August for seabeach amaranth plants or seedlings. An ORV closure would be designated around all emergent plants, providing a minimum 20-foot buffer around the plant.

RECREATION

An ORV corridor along the ocean shoreline would be provided as long as a minimum 150-foot buffer is maintained around piping plover nests. This buffer would increase to 600 feet once chicks become mobile, which could result in a closure that would limit ORV access along that stretch of beach. ORV closures would also be designated in sea turtle nest relocation areas and in individual nest buffer areas from 50 days after the first nest is laid until hatching. Off-road vehicles would be routed around the backside of the nest for turtles and colonial waterbirds or to a backroad, if available, and the beach would be closed from ramp to ramp. If necessary, ORV access could be provided through a closure for American oystercatcher or a limited ORV escort program (twice daily) could be instituted through bird closure areas to maintain access to key seashore areas such as Portsmouth Village. ORVs would be prohibited from Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. Night driving would be permitted outside of closure areas.

Pedestrians, including those with leashed pets, would be permitted in ORV closure areas. Pedestrians would not be allowed in full recreational closures.

Camping and beachfires would be prohibited in turtle nest relocation closures, and visitors staying in seashore cabins would be encouraged to minimize use of outside lights to prevent disturbance of hatchlings from artificial light.

Pets must be leashed or otherwise physically confined at all times in all areas of the seashore (36 CFR Sec. 2.15 Pets). Pets would be prohibited, even if on leash, from all full recreational closures. Fireworks are prohibited in the seashore at all times (36 CFR Sec. 2.38 Explosives).

OUTREACH AND COMPLIANCE

The seashore would continue to provide information about endangered species at the visitor center and through posted signs, site bulletins, and interpretive programs. Articles would be provided on the seashore's website. In addition, the public would be notified of closures that would temporarily limit ORV traffic via a press release to local and regional newspapers. Compliance checks and closure enforcement would be provided up to 2 to 3 days per week in each of four areas: North Core Banks and South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island.

COST OF IMPLEMENTATION

The costs associated with the no-action alternative would be primarily for species survey and management, interpretation, law enforcement, and associated equipment needs (table 5). Under alternative A, existing protected species management activities between the three divisions would continue. The amount of staff required would remain relatively constant with existing levels.

TABLE 5: COST ESTIMATE – ALTERNATIVE A: NO-ACTION, ALTERNATIVE, CONTINUATION OF CURRENT MANAGEMENT

Action	Assumptions	Annual Costs
Natural Resource Management	1 Chief (50% of time), 1 biologist, 1 seasonal employee, and two 12-week Student Conservation Association (SCA) interns.	Staff: \$130,000 Materials: \$25,500 Total: \$155,500
Interpretation	1 Chief Ranger (13% of time), 2 full-time interpreters (25% of time), two seasonal interpreters, 1 seashore guide, and one 6-month SCA intern.	Staff and Materials: \$76,088
Law Enforcement	1 Chief Ranger (10% of time), 1 supervisor, 1 full-time ranger, 2 seasonal rangers.	Staff: \$186,425 Materials: \$60,300 Total: \$246,725
TOTAL ANNUAL COST		\$478,313

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

The “no action” alternative is developed for two reasons. It may be a viable choice in the range of reasonable alternatives, and it sets a baseline of existing impacts continued into the future against which to compare impacts of action alternatives. The three action alternatives, alternatives B, C, and D, provide a range of reasonable alternatives. The following provides those management actions common to alternatives B, C, and D.

1. In general, because of the dynamic nature of the Cape Lookout National Seashore beaches and inlets, the management may change by location and time, and new sites (bars, islands) may require additional management, or management actions may become inapplicable for certain sites due to changes in ground conditions.
2. When new suitable bird nesting and/or seabeach amaranth habitat is created due to natural events, the area would not be closed until the following breeding season unless the habitat is established during the breeding season. The area would be closed when birds are found using it or seabeach amaranth seedlings/plants are found. If new habitat were created in high-use recreation areas, the area would be surveyed through June 15, and possibly closed to either all recreation (in the case of birds) or ORVs (in the case of seabeach amaranth) during that time dependent on habitat conditions and best professional judgment.
3. Data collection under each alternative would include documenting breeding and nest locations using a geographic positioning system (GPS) and incorporating data into a geographic information system (GIS) database.
4. Existing seashore regulations include:
 - a. 36 CFR 2.15(2), Pets: pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore.
 - b. 36 CFR 2.38, Explosives: all fireworks are prohibited in the seashore at all times.
 - c. 36 CFR 4.10, Travel on Park Roads and Designated Routes: operating a motor vehicle is prohibited except on park roads, in parking areas and on routes and areas designated for ORV use.
5. Following a hurricane or large storm, the seashore would close to visitors until ORV routes and protected species closure could be re-established. Overwash areas would be surveyed as appropriate for the time of year.
6. If staff were available, a vehicle escort program would be used on a very limited case-by-case basis around bird closures to maintain access to Portsmouth Village, the interior of Cape Lookout Point, or areas with no backroad access. Escorts would be led by trained resource management staff and would be limited to 25 vehicles or less. Escorts would occur once in the morning and once in the late afternoon.
7. ORVs would be prohibited from driving on the beach at Shackleford Banks, between mile markers 41A and 41B, Power Squadron Spit, the interior of Cape Lookout Point, and on Portsmouth Flats.
8. Ongoing studies would continue at Cape Lookout National Seashore and would include:
 - a. “Measure the Impact of Off-road Vehicles on Beach Birds” study conducted by Dr. Ted Simons and Nathan Tarr, Cooperative Research Group, North Carolina State University. This study will include a measurement of the impact of ORVs on shorebirds during fall migration.

- b. “Evaluate the Consequences of Predator Removal for Endangered Species at Cape Lookout National Seashore” conducted by Alan O’Connell, U.S. Geological Survey. A study of raccoon populations in the park and the implications of predator removal.
 - c. “Monitoring and Management of American Oystercatcher on Cape Lookout National Seashore” conducted by Dr. Ted Simons and Shiloh Schulte, Cooperative Research Group, North Carolina State University. The study will monitor American oystercatcher nesting and chick success/survival and document causes of chick mortality.
 - d. “Conduct a Visitor Use Survey at Cape Lookout National Seashore” by Hans Vogelsong, East Carolina University. This study will examine visitor use patterns, including ORV use.
- 9. The frequencies provided for species surveys are minimums. If a need is established for more frequent observations than the minimum stated, and staff is available, the seashore may conduct observations more frequently on a case-by-case basis.
- 10. All observations would be conducted by qualified NPS staff meeting the following minimum qualifications:
 - a. Staff used for field observations, education, and outreach would be trained by qualified National Park Service staff and would meet the following minimum qualifications:
 - i. Training would be conducted by a qualified staff biologist. Training would include:
 - 1. Job description/expectations
 - 2. Personal safety
 - 3. Professional behavior
 - 4. NPS and seashore rules, regulations, policies
 - 5. Geographic locations orientation
 - 6. Housing requirements
 - 7. ATV/beach driving
 - 8. Protected species monitoring and management
 - a. Identification
 - b. Behavior
 - c. Needs
 - d. Closures
 - 9. Completion of required forms, etc.
 - 10. Overview of existing park activities and studies occurring within the park
 - 11. Equipment care and upkeep
 - ii. Returning staff may not need the full training.
 - b. Seasonal employees, Student Conservation Association interns (6-month positions), and SCA interns (12-week positions) would be trained by the park biologist.
 - c. Piping plover training would be completed by April 15 and would include:
 - i. Knowledge of piping plover biology, behavior and habitats

- ii. Ability to identify piping plovers in both basic and alternate plumages
 - iii. Ability to identify shorebirds associated with piping plover
 - iv. Ability to identify potential predators, their tracks, and evidence of predation
 - v. Experience in using field binoculars, spotting scopes, and GPS equipment
 - vi. Ability to collect clear, comprehensive data
 - vii. Ability to communicate with the public
 - viii. Ability to perform physical work under adverse environmental conditions such as heat and humidity
 - ix. Ability to hike up to two miles in the sand carrying approximately 20 pounds
- d. Sea turtle training would be completed by June 1 and would include:
- i. Knowledge of Cape Lookout National Seashore sea turtle survey procedures
 - ii. Ability to identify sea turtle species and their nesting crawls
 - iii. Ability to differentiate between false crawls and nests
 - iv. Ability to locate and properly mark sea turtle nest chambers
 - v. Ability to relocate nests to suitable areas if necessary
 - vi. Ability to collect clear, comprehensive data
 - vii. Ability to use GPS equipment
 - viii. Ability to communicate with the public
 - ix. Ability to perform physical work under adverse environmental conditions such as heat and humidity
- e. Seabeach amaranth training would be completed by June 1 and would include:
- i. Ability to identify sea beach amaranth
 - ii. Ability to identify beach vitex
 - iii. Ability to use GPS equipment
 - iv. Ability to communicate with the public
 - v. Ability to hike up to 5 miles in sand carrying approximately 10 pounds
 - vi. Ability to perform physical work under adverse environmental conditions such as heat and humidity
11. Staff programming may be adjusted following the first season of the plan implementation.

ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Alternative B, as with all of the action alternatives, defines a range of observation and management actions. Alternative B would be similar to alternative A, except that species surveys would be increased weekly and buffers around bird nests, foraging chicks, and sea turtle nests would be increased, with an associated increase in closure size. More detailed information would be collected on some species. In addition to the year-round ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit, a full-recreational closure would be implemented for 2 miles along the north end of South Core Banks from the first nest hatch, until the last chick has fledged or is lost.

In summary, this alternative would provide increased protection from larger protective buffers around individual species nests, with some ramp-to-ramp full recreational closures to protect American oystercatcher chicks when present on the beach. Increased surveying of species would occur; however, there would be no significant changes in enforcement levels.

SPECIES SURVEYING AND MANAGEMENT

Species surveying would be more intensive before nesting than those described under alternative A. Seashore staff would survey historic nesting areas for piping and Wilson's plover pairs 7 days per week from April 15 to the last week in April, when surveys would be reduced to 3 days per week until the first nest is laid. Active nesting areas for colonial waterbirds would be surveyed 3 to 5 days per week and American oystercatchers at least 2 days per week. Shackleford Banks would be added to American oystercatcher surveys. Active nesting areas would be closed for all bird species as outlined in alternative A.

Breeding activity including courtship, mating, and nesting for piping plover and colonial waterbirds would be surveyed more intensely than in alternative A (7 days versus 2 to 3 days per week). Optical equipment would be used once incubation begins. Additional information would also be collected on predator and human activity around American oystercatcher and colonial waterbird nests, such as the presence of predator tracks and evidence of pedestrians and ORVs within nest buffers. Wilson's plover nests would be posted if they were found outside existing closures on North Core Banks and South Core Banks. Buffer areas around nests would be the same as in alternative A, except that colonial waterbird full recreational closures would be expanded to 300 feet from all nests.

Once nests hatch, closure areas for piping plover (a 600-foot buffer around each brood) and American oystercatchers would be the same as alternative A, except a 2-mile full recreational closure would be implemented at the north end of South Core Banks from first piping plover nest hatch until the last piping plover chick has fledged or is lost. If American oystercatcher chicks are on the beach, ramp-to-ramp ORV closures would occur and vehicles would be routed to the backroad. If necessary, a limited escort program could be implemented to allow continued access to important seashore areas as outlined in alternative A. Closures would follow American oystercatcher movements with a minimum 300-foot buffer. ORVs would be allowed along the ocean shoreline as long as buffers could be maintained. Tern and skimmer historic nesting areas would also be subject to full recreational closure.

ORV closures would be maintained at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along the beach between mile markers 41A and 41B, and Power Squadron Spit. Full recreational closures would be established for key piping plover winter habitat and the 2-mile ORV closure at the north end of South Core Banks would be maintained throughout the non-breeding season. Non-breeding piping plovers, American oystercatchers, and red knots would be surveyed each year.

Surveys for turtle nests would be the same as alternative A, except surveys would be expanded from May 1 to August 31, with increased surveying on Shackleford Banks. Active nest surveys would continue beyond August until hatching occurs. Once a turtle nest is discovered, the nest would be marked with stakes and managed to prevent predators and light pollution as described in alternative A; however, a full recreational closure (30 feet square) would be established immediately around each nest until 50 days after the nest is laid, an ORV closure would be delineated to below the high tide line. In addition, nest relocation areas would be established as in alternative A and all nests that are laid at or below the high tide line or in areas where they may be eroded or washed would be relocated to these areas.

By May 1, potential seabeach amaranth habitat would be identified based on historic and extant populations within the past 3 years. This habitat would be surveyed outside existing bird closures several times per week beginning in June. The surveys and ORV closures described in alternative A would also be conducted, as well as in all bird and turtle closures prior to reopening them to ORV traffic, except a 30-foot buffer would be established around any plant found outside existing closures. Areas would be re-opened where no plants occur, but where plants are found, ORV closures would remain intact until the end of the plant's growing season.

RECREATION USE

As noted above, ORVs would be prohibited year-round from Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along the beach between mile markers 41A and 41B, Power Squadron Spit; and from the first nest hatch to the last chick fledged or lost along 2-miles at the north end of South Core Banks. All ORVs would be prohibited from Middle Core Banks and "Ophelia Banks" from April 1 to August 31.

ORV traffic would be allowed in a corridor along the shoreline as long as a minimum 150-foot buffer is maintained for active piping plover breeding areas and 150- to 600-foot buffer is maintained around active colonial waterbird breeding areas. Similarly, American oystercatcher chicks would require a ramp-to-ramp full recreational closure unless there is no backroad available; then, ORVs would be permitted at 15 mph. As described in alternative A, ORV access via backroads would be considered first when chicks are mobile and beach access is not possible, however vehicular access through the closure or an escort system may be possible in some circumstances. The 30-foot buffers that surround seabeach amaranth and sea turtle nests are also larger than alternative A.

Full recreational closures would occur around piping plover, tern, and skimmer historic breeding areas. These full recreational closures would be expanded as necessary when nests or nest scrapes are found in new areas. Under alternatives B and C, full recreational closures would be established around turtle nests as well.

Pets would be prohibited from within the seashore from April 15 to August 31. At other times, pets would be leashed, under control by their owners, and prohibited from all full recreational closure areas. Other recreational uses such as kite flying would be prohibited from April 1 to August 31 each year. Fireworks are prohibited in the seashore at all times (36 CFR Sec. 2.38 Explosives). Camping would be prohibited within 600 feet of any turtle closures and in areas where a high nest concentration of American oystercatchers occurs (three or more nests between two access ramps). Additionally, night driving would be prohibited from Ramp 41B to Ramp 44 from 8:00 PM to 6:00 AM throughout sea turtle nesting season. In addition, beachfires would be prohibited within 600 feet of any turtle nest.

OUTREACH AND COMPLIANCE

As described in alternative A, the seashore would continue to provide information about endangered species at the visitor center and through posted signs, site bulletins, and interpretive programs; articles would be provided on the seashore's website; and the public would be notified of closures that would temporarily limit ORV traffic. In addition, 1 seashore employee would be stationed at the Long Point and

Great Island ferry landings 4 days per week, 10 hours per day to relay educational information about species and closures and the seashore would work with local museums and environmental education centers to educate visitors about sea turtles.

Compliance checks and closure enforcement would be provided up to 2 to 3 days per week in each of four areas: North Core Banks and South Core Banks, Shackleford, and Middle Core/Harkers Island. Night patrol would be provided 4 nights per month in each of the four areas above, including “Ophelia Banks.”

COST OF IMPLEMENTATION

Costs of implementing alternative B would include the same costs described under the no-action alternative (continuation of current management), plus costs of hiring additional resource management, interpretation, and law enforcement staff as well as one-time costs for new construction and equipment (see table 6).

TABLE 6: COST ESTIMATE—ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Action	Assumptions	Annual Costs
Natural Resource Management	Same as alternative A, plus upgrade current biologist, and add 1 biologist, 1 seasonal employee, and three 6-month SCA interns.	Staff: \$131,500 Materials: \$58,000 Alternative A (\$155,500) + \$189,500 Total annual costs = \$345,000 One-time cost for cabin construction, 1 boat, and 4 ATVs - \$203,000
Interpretation	Same as alternative A with the addition of 1 seasonal interpreter.	Staff: \$22,000 Alternative A (\$76,088)+ \$22,000 Total annual costs = \$98,088
Law Enforcement and Education/Outreach	Same as alternative A with the addition of one 10-month permanent law enforcement position and two 6-month seasonal law enforcement positions.	Staff: \$140,300 Alternative A (\$246,725) + \$140,300 Total annual costs = \$387,025
TOTAL ANNUAL COST (including alternative A)		\$830,113
One-time construction and acquisition cost (year 1)		\$203,000

ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Alternative C would provide protection to sensitive and listed species within the seashore through increased enforcement and some full recreational closures for American oystercatcher and some species of colonial waterbirds. Visitor outreach efforts would be increased, providing staff at ferry landings the opportunity to inform the public of species management activities and related closures.

SPECIES SURVEYING AND MANAGEMENT

Species survey activities prior to nesting would be more intensive (as described in alternative B), except for American oystercatchers which would be surveyed on North Core Banks and South Core Banks 2 days per week beginning in mid-April.

During courtship, mating, and nesting, piping plover would be observed 7 days per week as described in alternative B, whereas other bird species would be surveyed less frequently as in alternative A. American oystercatcher breeding behavior could result in an ORV closure between two ramps when three or more American oystercatcher pairs display courtship or mating behavior. Closures around bird nests would be the same as alternative A, except for colonial waterbirds where buffers would be expanded from 150 feet to 300 feet if a backroad were available on which to route ORVs. A full recreational closure would be established around tern and skimmer active breeding areas. Increased enforcement would also occur to ensure compliance with full recreational and ORV closures.

Once nests hatch, chicks foraging on the beach would be observed 7 days per week for piping plovers and 3 to 5 days per week for American oystercatchers or colonial waterbirds. Wilson's plovers would be surveyed if observed in existing piping plover closures. ORV closures to protect mobile chicks and accommodations during chick foraging would be the same as described in alternative B for all bird species, except that increased law enforcement activity would help increase public compliance with closures. ORV closures would be maintained at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along the beach between mile markers 41A and 41B, Power Squadron Spit, and the 2-mile vehicle ORV closure at the north end of South Core Banks. Again, increased law enforcement activity would help increase public compliance with closures. All closures involving key piping plover wintering habitat and the ORV closure at the north end of South Core Banks would be maintained throughout the non-breeding season.

Sea turtle surveys and information collected would be the same as that described under alternative A. In summary, they would occur daily from June 1 through August 31 at South Core Banks and North Core Banks; 2 to 3 days per week at Shackleford Banks; and irregularly at Middle Core Banks due to difficult access. Nests would be protected from ORVs, pedestrians, and predators as described in alternative A and relocated to designated relocation areas, if necessary, also as described in alternative A.

Seabeach amaranth would be surveyed and protected as described in alternative A, except that habitat outside existing bird closures would be surveyed and buffers around plants would be expanded from 20 to 30 feet. ORV and tent camping would be prohibited within this area and a closure established. Similar to alternative B, bird and turtle closures would be surveyed for seabeach amaranth prior to opening them to ORV traffic. In addition, tent camping would be prohibited in areas closed for this plant.

RECREATION

As described in alternative B, ORVs would be prohibited year-round from Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. The 2-mile closure (to ORV activity) along the northern 2 miles of South Core

Banks would be in place from the first nest hatch (for birds) to when the last chick has fledged. ORVs would be prohibited on Middle Core Banks and “Ophelia Banks” from April 1 to August 31.

Other ORV and pedestrian restrictions would be the same as alternative A, except that any area with three or more courting or nesting American oystercatcher pairs would be closed between two ramps and ORV traffic would be routed to the backroad. Additionally, all buffers around colonial waterbirds would expand to 300 feet where a backroad is available. Elements of alternative A include a minimum 150-foot nest buffer for piping plover that would increase to 600 feet once chicks become mobile, which could possibly result in the closing of a stretch of beach to ORV access. ORVs would be prohibited from sea turtle nest relocation areas and in individual turtle nest closures. ORVs would be routed around the duneside of the nest for turtles and colonial waterbirds or to the backroad, if available, and the beach would be closed from ramp to ramp. If necessary, ORV access could be provided through a closure for American oystercatchers or a limited ORV escort program (twice daily) could be implemented. Pedestrians would be excluded from piping plover full recreational closures and turtle closures, but would be permitted along the high tide line when chicks are mobile.

Pets and night driving would be managed the same as alternative A, except there would be increased enforcement. Kite flying would be prohibited from April 1 through August 31. Camping would be prohibited within areas with a high concentration of American oystercatcher nests. Beachfires or artificial lights would be prohibited within 600 feet of turtle closures similar to alternative B.

OUTREACH AND COMPLIANCE

Outreach activities would include those listed in alternative A, but would also include new and improved closure signs to make them more visible to vehicle passengers on the beach, including new signs for seabeach amaranth. Vehicle closure information would be posted on a map on the seashore website and at ferry landings. One person would be stationed 7 days per week, 10 hours per day at the Long Point and Great Island ferry landings to relay educational information about species closures. Compliance checks and closure enforcement would occur more frequently – 3 to 5 days per week – than in alternative B, but would occur in the same areas and include the same night patrols.

COST OF IMPLEMENTATION

Costs of implementing alternative C would include the same costs described under the no-action alternative (continuation of current management), plus costs of hiring additional resource management, interpretation, and law enforcement staff as well as one-time costs for new construction and equipment (see table 7).

TABLE 7: COST ESTIMATE—ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT, INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Action	Assumptions	Annual Costs
Natural Resource Management	Same as alternative B.	Staff: \$131,500 Materials: \$58,000 Alternative A (\$155,500) + \$189,500 Total annual costs = \$345,000 One-time cost for cabin construction, 1 boat, and 4 ATVs - \$203,000
Interpretation	Same as alternative A, plus two seasonal interpreters.	Staff: \$44,000 Alternative A (\$76,088) + \$44,000 Total annual costs = \$120,088
Law Enforcement	Same as alternative A, plus three 10-month permanent law enforcements positions and four 6-month seasonal law enforcement positions	Staff: \$377,100 Alternative A (\$246,725) + \$377,100 Total annual costs = \$623,825 One-time cost of \$38,000 for 2 ATVs and 7 radios.
TOTAL ANNUAL COST (including alternative A)		\$1,088,913
One-time construction and acquisition cost (year 1)		\$241,000

ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Alternative D would provide increased species protection through a variety of adaptive management measures, including ramp-to-ramp full recreational closures for unfledged American oystercatcher if a backroad is present. Some additional species surveying would occur above current levels. Visitor outreach efforts would be increased, providing staff at ferry landings to inform the public of species management activities and related closures.

SPECIES SURVEYING AND MANAGEMENT

Species surveying prior to nesting and during courtship would be the same as alternative A for all bird species, except that piping plover habitat would be surveyed at least 7 days per week on North Core Banks and South Core Banks and 1 day per week in other areas beginning in mid-April. On April 1, the following would be closed to all recreational use:

- All active, historic, and potential new piping plover habitat as determined appropriate by a qualified staff biologist
- Colonial waterbird active nesting areas from the previous breeding season

Wilson's plover nests or scrapes found outside existing closures on North Core Banks and South Core Banks would be posted. American oystercatcher activity would be managed the same as under alternative A.

During nesting and hatching, piping plover nests would be checked every day and American oystercatchers and colonial waterbirds every two days on North Core Banks and South Core Banks. Data collected would be the same as in alternative A, except predator information would be collected for American oystercatchers. Closures around nests would be the same as alternative A for all bird species and ORV traffic would be allowed along the shoreline as long as a minimum 150-foot buffer could be maintained. As outlined in alternative A, buffers and associated full recreational closures would include:

- 150 feet for piping plovers and predator exclosures around nest
- 10 square feet for American oystercatchers
- 150 feet for colonial waterbirds that may expand as necessary for new nests or scrapes
- posts around Wilson's plover nests outside of existing closures on North Core Banks and South Core Banks

Once the nest is hatched and chicks are mobile, piping plovers and American oystercatchers would be protected as outlined in alternative C. Chicks would be protected by buffers, beaches could be closed to ORVs between two ramps, and ORVs would be routed to backroads. Closures would move with the chicks. If no backroad was available, access could be allowed through an American oystercatcher closure at 15 mph or a limited escort program could be implemented twice per day to allow access to important seashore areas. Migrating and wintering habitat for all bird species would be managed the same as under alternative A.

Sea turtle surveys and information collected would be the same as that described under alternative A. In summary, they would occur daily from June 1 through August 31 at South Core Banks and North Core Banks; 2 to 3 days per week at Shackleford Banks; and irregularly at Middle Core Banks due to difficult access. Nests would be protected using ORV closures, plus screening and various light management techniques. Nests would be relocated to designated relocation areas, if necessary, as described in alternative A.

Seabeach amaranth would be managed the same as in alternative C.

FEDERALLY-LISTED SPECIES CONSERVATION MEASURES

In addition to the management actions identified above and in “Table 1: Alternatives Elements Summary—Species Survey and Management,” the following conservation measures would be proposed in compliance with Section 7 of the Endangered Species Act. The conservation measures are actions that when implemented would result in reducing or avoiding adverse effects to and incidental take of listed species. These resource protection strategies would be implemented to provide an effective survey and management program under this interim protected species management plan/EA. Additionally, information generated from the research studies and surveying can be used in the development of the long-term ORV management plan/EIS.

Piping Plover

The following actions would be implemented:

- Monitor abundance and distribution of wintering plovers through specific winter surveys.
- Provide monitoring data to the U.S. Fish and Wildlife Service so that the information may be combined with data from other monitoring efforts to determine the significance of Cape Lookout National Seashore breeding or wintering population segments to the state, region (middle Atlantic coast), or Atlantic coast population changes and trends.
- Document violations of closures by ORVs, pedestrians, and leashed and unleashed pets.
- Monitor plover breeding activities at nesting sites to identify factors that may be limiting abundance of nesting plovers and/or productivity.
- Monitor the impact of mammalian and bird predators on piping plover breeding productivity.

Funds would be sought to provide for intensive research studies and surveys would be developed and implemented to address the following issues relative to the piping plover:

- Study the role of habitat in fledging success of piping plover chicks.
- Partner with the Navy overflight study to measure the impact of overflights on piping plovers and other shorebirds.
- Study the response of migrating and wintering piping plovers to disturbance by ORVs, pedestrians and pets. Determine the flushing distance for each of these disturbances.

Sea turtles

The following actions would be implemented:

- Monitor the number of nesting females and their reproductive success so that the current contribution of Cape Lookout National Seashore to regional population dynamics can be better understood.
- Monitor the impacts of predators on sea turtle nests.
- Document violations of sea turtle closures by ORVs.

Funds would be sought to provide for intensive research studies and surveys to address the following issues relative to sea turtles:

- Determine the effects of night driving on nesting sea turtles at Cape Lookout National Seashore.

Seabeach amaranth

The following actions would be implemented:

- Monitor the effects of nutria grazing on seabeach amaranth at Cape Lookout National Seashore.

Funds would be sought to provide for intensive research studies and surveys would be developed and implemented to address the following issues relative to the piping plover:

- Determine and assess effects of both natural and human disturbances, including ORV use, to the species at Cape Lookout National Seashore.
- Determine the affect of webworm herbivory on seabeach amaranth at Cape Lookout National Seashore.

RECREATION

As described in alternative B, ORVs would be prohibited year-round from Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. The 2-mile ORV closure along the northern 2 miles of South Core Banks would be in place from the first nest hatch (birds) to when the last chick has fledged or is lost. ORVs would be prohibited on Middle Core Banks and “Ophelia Banks” from April 1 to August 31.

ORVs would be allowed in a corridor along the shoreline as long as 150-foot and 600-foot buffers could be maintained from nesting and foraging piping plover chicks, respectively. If a chick is found using the ocean beach, a closure could occur immediately and ORVs would be routed to a backroad. A minimum 300-foot buffer would be provided for mobile American oystercatcher chicks and ramp-to-ramp ORV closures would be adjusted to follow chick movement. Access could be allowed through American oystercatcher closures if no backroad access is available. Vehicle escorts could also be implemented if necessary. ORVs would also be routed around colonial waterbird closures. ORVs would be prohibited from entering sea turtle relocation areas and from turtle closures from 50 days after the first nest is laid until after the nest is hatched. ORV access would be provided around the nest as described in alternative A.

As described in alternative A, pedestrians would be permitted in ORV closures. When ORV closures are established due to mobile chicks or turtle nests, pedestrian access would be maintained. Pedestrians would not be allowed in full recreational closures around piping plover nests.

Pets would be required to be leashed or otherwise physically confined at all times in all areas of the seashore. Pets would be prohibited, even if on leash, from all full recreational closures. Fireworks are prohibited in the seashore at all times (36 CFR Sec. 2.38 Explosives.).

Camping and beachfires would be prohibited in turtle nest relocation closures, and visitors staying in seashore cabins would be encouraged to minimize use of outside lights to prevent disturbance of hatchlings from artificial light.

OUTREACH AND COMPLIANCE

Outreach activities would include those listed in alternative A, but include one person stationed 7 days per week, 10 hours per day at ferry landings to relay educational information about species closures. In addition, education efforts would be increased regarding pet leash regulations.

Compliance checks and closure enforcement would occur 2 to 3 days per week in the same areas as alternative A and would not include night patrols. Information and education would be provided 100% of the time at the Long Point and Great Island ferry landings.

COST OF IMPLEMENTATION

Costs of implementing alternative D would include the same costs described under the no-action alternative (continuation of 2004 management), plus costs of hiring additional resource management, interpretation, and law enforcement staff as well as one-time costs for new construction and equipment (see table 8).

TABLE 8: COST ESTIMATE—ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Action	Assumptions	Annual Costs
Natural Resource Management	Same as alternative A, plus 1 seasonal employee, two 6-month SCA interns and cabin rental, maintenance support, and other costs.	Staff and materials: \$103,000 Alternative A (\$155,500) + \$103,000 Total annual costs = \$258,500 One-time cost for 2 ATVs = \$9,000
Interpretation	Same as alternative A, plus four 6-month seasonal interpretive positions and cabin rental, maintenance support, and other costs.	Staff and materials: \$121,000 Alternative A (\$76,088) + \$121,000 Total Annual costs = \$197,088
Law Enforcement	Same as alternative A.	Same as alternative A. Staff: \$186,425 Materials: \$60,300 No additional costs. Total annual costs: \$246,725
TOTAL ANNUAL COST (including alternative A)		\$702,313
One-time acquisition cost (year 1)		\$9,000

HOW ALTERNATIVES MEET OBJECTIVES

As stated in the “Purpose and Need for Action” chapter, all action alternatives selected for analysis must meet all objectives to a large degree. The action alternatives must also address the stated purpose of taking action and resolve the need for action; therefore, the alternatives and the effects they would have in the study area were individually assessed in light of how well they would meet the objectives of this plan/EA as compared to alternative A, the no-action alternative. Alternatives that did not meet the objectives were not analyzed further (see the “Alternatives Considered but Rejected” section in this chapter).

The plan’s objectives are to:

- Management Methodology
 - Formalize adaptive interim management practices and procedures that have the ability to respond to changes in the Seashore’s dynamic physical and biological environment.
 - Provide procedures for prompt and efficient public notification of protected species management actions including the reasons for these actions.
 - Continue an ongoing and meaningful dialogue with the multiple publics interested in and affected by protected species management to ensure development of a workable plan.
- Visitor Use and Experience
 - Provide for continued recreational use and access consistent with required management of protected species.
 - Increase opportunities for public awareness and understanding of NPS resource management and visitor use policies and responsibilities as they pertain to the seashore and protected species management.
- Threatened, Endangered, and Other Protected Species
 - Provide protection for threatened, endangered, and other protected species (e.g., state-listed species) and their habitats from adverse impacts related to recreational uses as required by state and federal laws and policies.
 - Actively consult and cooperate with the U.S. Fish and Wildlife Service to ensure that NPS management actions comply with the requirements of the Endangered Species Act.
- Seashore Management and Operations
 - Develop an interim protected species management plan that minimizes impacts to other seashore operations.

Tables 1 and 2 summarize the elements of the alternatives being considered, while table 3 compares how each of the alternatives described in this chapter would meet the above-listed objectives. The “Environmental Consequences” chapter describes the effects on each impact topic under each of the alternatives, including the impact on recreational values and visitor experience. These impacts are summarized in table 4. These tables appear at the end of this chapter.

ALTERNATIVES CONSIDERED BUT REJECTED

During the public scoping period the NPS received a number of suggestions for alternatives. As a result changes were made to the preliminary alternative concepts presented at public scoping including incorporation of more education and more enforcement, various buffer sizes, and provisions for ORV access. Some suggested alternatives or elements of alternatives received during public scoping or suggested during internal NPS scoping have been carried forward for consideration as alternatives under the long-term ORV management plan/EIS planning process rather than being included as fully analyzed alternatives for this interim protected species management plan/EA.

CLOSURES FOR BIRDS AND TURTLES SHOULD BE KEPT TO A MINIMUM

Public comments were received suggesting different sizes for buffers or that buffers and their associated closures be kept to a minimum. This EA evaluates a range of alternatives that considers various buffer sizes and closure areas. Buffer sizes below what has been analyzed would result in the seashore populations listed species under the Endangered Species Act and protected species under the Migratory Bird Treaty Act being subject to increased rates of disturbance and mortality. Breeding and the buffers required for successful breeding are essential for a species to perpetuate itself through time. Breeding typically occurs in spring and summer. For example, the piping plover breeding season begins in March and April and extends through August, when most of the newly hatched chicks have fledged. Loggerhead sea turtles mate during late-March through early-June, with nesting occurring throughout the summer. Similarly leatherback sea turtles nest from February through July, whereas the green sea turtle nests from June through November. Failure to adequately protect breeding individuals, nests, and young using measures such as closures would result in further species decline. In addition, any unauthorized harm, injury, or mortality of protected species under the Endangered Species Act would result in a violation of federal law, potential fines, and other criminal charges. For the reasons identified above, this element has been considered but eliminated from further analysis.

OPEN TURTLE CLOSURES AFTER HATCHLINGS HAVE GONE OUT TO SEA

Current management practices at the seashore implement this practice. Once a nest has hatched and has been excavated by seashore staff to determine hatching success, the closure is reopened.

INCREASE FINES FOR PEOPLE BREAKING RULES

This alternative may be considered during the development of the long-term ORV management plan/EIS at Cape Lookout National Seashore, as it requires coordination with the U.S. District Court and other parks. Although increasing fines is one way to increase deterrence, fines that are too high can be counter-productive, causing a greater number of violators to seek court appearances rather than paying the fines and thereby create a significant additional workload for both the officer and the court.

Additional research and coordination, not immediately within the scope of this plan, would need to be conducted to determine the potential fine limits and how to implement them at the seashore.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In addition to identifying the preferred alternative, the NPS has also identified the “environmentally preferable alternative” as defined by the U.S. Council on Environmental Quality. Simply put, “this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves and enhances historic, cultural, and natural resources” (U.S. Council on Environmental Quality 1981, 2004c). There is no requirement that the environmentally preferable alternative and the preferred alternative be the same. After completing the environmental impact analysis, the NPS identified alternative C as the environmentally preferred alternative in this EA because it best meets the definition established by the U.S. Council on Environmental Quality.

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
Bird—Pre-nesting*	Species Survey			
	<p>PIPL—Survey active¹ nesting areas for pairs at least 3 days per beginning the last week in April. Survey potential new habitat and historic² nesting areas, as time permits until first nest laid, if applicable.</p> <p>AMOY—Survey all NCB and SCB beaches for AMOY activity 2 days per week beginning mid-April. Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey active nesting areas for CWB at least 3 days per week when PIPL monitoring occurs. Survey potential new habitat and historic nesting areas as time permits. Surveys cease when all chicks have fledged or are lost.</p> <p>Every 3 years during the statewide census, map colonies using GPS.</p> <p>WIPL—No survey.</p>	<p>PIPL—Survey active and historic nesting areas for pairs 7 days per week beginning April 15. Surveys may occur any time of day.</p> <p>AMOY—Survey NCB and SCB for activity at least 2 days per week beginning late-March. Survey Shackleford Banks 2 days per week. Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey active and historic nesting areas for CWB 3 to 5 days per week when PIPL monitoring occurs. Survey potential new habitat as time permits. Surveys cease when all chicks have fledged or are lost.</p> <p>Every 3 years during the statewide census, map colonies using GPS.</p> <p>WIPL—Survey for WIPL during annual PIPL nesting census conducted each spring.</p>	<p>PIPL—Survey active and historic nesting areas for pairs 7 days per week beginning April 15. Surveys may occur any time of day (same as alternative B).</p> <p>AMOY—Survey all NCB and SCB beaches for AMOY activity 2 days per week beginning mid-April. Surveys cease when all chicks have fledged or are lost (same as alternative A).</p> <p>CWB—Survey active and historic nesting areas for CWB 3 to 5 days per week when PIPL monitoring occurs. Survey potential new habitat as time permits. Surveys cease when all chicks have fledged or are lost.</p> <p>Every 3 years during the statewide census, map colonies using GPS (same as alternative B).</p> <p>WIPL—Survey for WIPL during annual PIPL nesting census conducted each spring (same as alternative B).</p>	<p>PIPL—Survey active nesting areas for pairs at least 7 days per week on North Core Banks (NCB) and South Core Banks (SCB) and at least 1 day per week in other areas beginning mid-April. Survey would include potential new habitat and historic nesting areas as determined appropriate by a qualified staff biologist.</p> <p>AMOY—Survey all NCB and SCB beaches for AMOY activity 2 days per week beginning mid-April. Surveys cease when all chicks have fledged or are lost (same as alternative A).</p> <p>CWB—Survey active nesting areas for CWB at least 3 days per week when PIPL monitoring occurs. Survey potential new habitat and historic nesting areas as time permits. Surveys cease when all chicks have fledged or are lost.</p> <p>Every 3 years during the statewide census, map colonies using GPS (same as alternative A).</p> <p>WIPL—No survey (same as alternative A).</p>

¹ Active nesting areas are those areas where birds are presently nesting or nested the previous breeding season.

² Historic nesting areas are those areas where birds nested the previous 5 years (this includes active nesting areas).

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
Bird—Pre-nesting	Species Management			
	<p>PIPL—April 01, establish full recreational closure in active nesting areas.</p> <p>Enlarge protected areas where PIPL observed prospecting for territories outside of full recreational closure area.</p> <p>If birds do not use site, open by July 15.</p> <p>AMOY—Pre-nesting closures are not established around known active nesting areas.</p> <p>CWB—April 15, establish full recreational closure in active CWB nesting areas. Establish ORV closures in historic least tern and black skimmer nesting areas used by tern and skimmer.</p> <p>Closures would be expanded as necessary when nests or nest scrapes are found in new areas.</p>	<p>PIPL—April 01, establish full recreational closure in active nesting areas (same as alternative A).</p> <p>Enlarge protected areas where PIPL observed prospecting for territories outside of full recreational closure area (same as alternative A).</p> <p>If birds do not use site, open by July 15 (same as alternative A).</p> <p>CWB—April 15, establish full recreational closure in active CWB nesting areas. Establish ORV closures in historic least tern and black skimmer nesting areas used by tern and skimmer (same as alternative A).</p> <p>Closures would be expanded as necessary when nests or nest scrapes are found in new areas (same as alternative A).</p>	<p>PIPL—April 01, establish full recreational closure in active nesting areas (same as alternative A).</p> <p>Enlarge protected areas where PIPL observed prospecting for territories outside of full recreational closure area (same as alternative A).</p> <p>If birds do not use site, open by July 15 (same as alternative A).</p> <p>CWB—April 15, establish full recreational closure in active CWB nesting areas. Establish ORV closures in historic least tern and black skimmer nesting areas used by tern and skimmer (same as alternative A).</p> <p>Closures would be expanded as necessary when nests or nest scrapes are found in new areas (same as alternative A).</p> <p>Increase enforcement of public compliance with closures.</p>	<p>PIPL—April 01, establish full recreational closure in active, historic, and potential new habitat as determined by a qualified staff biologist.</p> <p>Enlarge protected areas where PIPL observed prospecting for territories outside of full recreational closure area (same as alternative A).</p> <p>If birds do not use site, open by July 15 (same as alternative A).</p> <p>CWB—April 01, establish full recreational closure in active CWB nesting areas. Establish ORV closures in historic least tern and black skimmer nesting areas and any potential new habitat where, from site inspection, a qualified staff biologist determines that nesting may be likely to occur.</p> <p>Closures would be expanded as necessary when nests or nest scrapes are found in new areas (same as alternative A).</p>
	WIPL—No closures outside of existing bird closures established for other species.			
Bird—Courtship/Mating*	Species Survey			
	<p>PIPL—Survey, at least 3 days per week, locations where territorial, courtship, and/or mating behavior observed.</p> <p>AMOY—Survey number (pair/single), behavior, courtship, and evidence of scrapes.</p>	<p>PIPL—Survey 7 days per week locations where territorial, courtship, and/or mating behavior observed.</p> <p>AMOY—Survey number (pair/single), behavior, courtship, and evidence of scrapes. Record locations using GPS.</p>	<p>PIPL—Survey 7 days per week locations where territorial, courtship, and/or mating behavior observed (same as alternative B).</p> <p>AMOY—Survey number (pair/single), behavior, courtship, and evidence of scrapes (same as alternative A).</p>	<p>PIPL—Survey, 7 days per week NCB and SCB and other areas at least 1 day per week, locations where territorial, courtship, and/or mating behavior observed.</p> <p>AMOY—Survey number (pair/single), behavior, courtship, and evidence of scrapes (same as alternative A).</p>

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
Bird— Courtship/Mating*	CWB—Record territorial/mating behavior if observed during PIPL surveys. WIPL—No monitoring.	CWB—Record territorial/mating behavior if observed during PIPL surveys (same as alternative A). WIPL—Record territorial/mating behavior if observed during PIPL surveys.	CWB—Record territorial/mating behavior if observed during PIPL surveys (same as alternative A). WIPL—No monitoring (same as alternative A).	CWB—Record territorial/mating behavior if observed during PIPL surveys (same as alternative A). WIPL—No monitoring (same as alternative A).
	Species Management			
	PIPL—Expand full recreational closures to provide for a 150-foot buffer in areas of territorial, courtship, and/or mating (scrapes) behavior occurring outside existing closures. AMOY—No closures. CWB—Establish full recreational closure in areas where scrapes are found. WIPL—No closures outside of other existing bird closures.	PIPL—Expand full recreational closures to provide for a 150-foot buffer in areas of territorial, courtship, and/or mating (scrapes) behavior occurring outside existing closures (same as alternative A). AMOY—No closures (same as alternative A). WIPL—No closures outside of other existing bird closures (same as alternative A).	PIPL—Expand full recreational closures to provide for a 150-foot buffer in areas of territorial, courtship, and/or mating (scrapes) behavior occurring outside existing closures (same as alternative A). AMOY—Establish ORV closure in any area between two ramps that has 3 or more AMOY pairs displaying courtship/mating behavior; ORV traffic routed to backroad. WIPL—No closures outside of other existing bird closures (same as alternative A).	PIPL—Expand full recreational closures to provide for a 150-foot buffer in areas of territorial, courtship, and/or mating (scrapes) behavior occurring outside existing closures (same as alternative A). AMOY—No closures (same as alternative A). WIPL—Post WIPL nests or scrapes found outside existing closures on NCB and SCB.
Bird—Nesting*	Species Survey			
	PIPL—Survey nests at least once every 2 days. Record (1) date & time; (2) nest number; (3) nest location with a GPS unit (1 time). Nest markers should not be placed in the sand; (4) number of eggs (if bird is not flushed, record that the bird was incubating and number of eggs was not observed); (5) habitat; (6) status of nest (laying, incubating, lost, abandoned, hatching, hatched); (7) presence and behavior of the adults [incubating eggs, shading eggs, resting, foraging, disturbed (record source), territorial flight, territorial encounter, distraction display or other defensive	PIPL—Survey nests 7 days per week. After April 20th, survey for new nests at least once every two to three days, as logistics permit. Record the same information as identified under alternative A. After incubation starts, observe the incubating bird with optical equipment from appropriate distance that does not disturb the birds (same as alternative A).	PIPL—Survey nests 7 days per week. After April 20th, survey for new nests at least once every two to three days, as logistics permit (same as alternative B). Record the same information as identified under alternative A. After incubation starts, observe the incubating bird with optical equipment from appropriate distance that does not disturb the birds (same as alternative A).	PIPL—Survey nests 7 days per week on NCB and SCB. Survey nests at least one day per week if they occur elsewhere. Record the same information as identified under alternative A. After incubation starts, observe the incubating bird with optical equipment from appropriate distance that does not disturb the birds (same as alternative A).

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	behavior toward predator or pedestrian,			
	<p>courtship, other behavior (describe)]; (8) presence of potential predators, humans, pets, or ORVs within 300 feet and locations relative to the nest; (9) evidence (i.e., trails) of potential predators, humans, or ORVs within posted areas, including distance to the nest; and (10) suspected cause of nest loss, if apparent.</p> <p>After incubation starts, observe incubating bird with optical equipment from appropriate distance that does not disturb birds.</p> <p>AMOY—Survey nests at least once every 3 days. Record (1) nest locations with GPS and mile marker locations and (2) number of eggs present and hatch date.</p> <p>CWB—Survey nests at least once every 2 to 3 days when PIPL monitoring occurs. Record center of colony using GPS. Record same information as PIPL except regular counts of CWB are not performed and productivity information is not recorded.</p>	<p>AMOY—Survey nests at least once every 2 days. Record (1) nest locations with GPS and mile marker locations; (2) number of eggs present and hatch date; (3) presence or evidence of predators, including trails within 30 feet of the nest; and (4) human, or ORV tracks within 90 feet of a nest.</p> <p>CWB—Survey nests 7 days per week. After April 20th, survey for new nests at least once every two to three days, as logistics permit. Record the same information as identified under alternative A, plus (1) number of potential predators, including pedestrians and ORV within 300 feet of the nest; (2) presence of predators tracks and/or evidence of pedestrians and/or ORV within 300 ft of the nest; and (3) productivity.</p> <p>After incubation starts, observe the incubating bird with optical equipment from appropriate distance that does not disturb the birds.</p>	<p>AMOY—Survey nests at least once every 2 days (same as alternative B). Record the same information as identified under alternative B.</p> <p>CWB—Survey nests at least once every 2 to 3 days when PIPL monitoring occurs. Record center of colony using GPS. Record same information as PIPL except regular counts of CWB are not performed and productivity information is not recorded (same as alternative A).</p>	<p>AMOY—Survey nests every 2 days on NCB and SCB, other areas 1 day per week. Record the same information as identified under alternative B.</p> <p>CWB—Survey nests at least once every 2 days on NCB and SCB and 1 day per week elsewhere when PIPL monitoring occurs. Record center of colony using GPS. Record same information as PIPL alternative A except regular counts of CWB are not performed and productivity information is not recorded (same as alternative A).</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	WIPL—No survey.	WIPL—Survey nests if observed in existing PIPL closure.	WIPL—Survey nests if observed in existing PIPL closure (same as alternative B).	WIPL—Census WIPL during annual PIPL window census (1 st week of June).
Bird—Nesting*	<p>Species Management</p> <p>PIPL—Expand full recreational closures to provide for a 150-foot buffer around nests.</p> <p>Place predator exclosures over nest after 4th egg is laid if conditions allow.</p> <p>Areas remain closed until chicks fledge or are lost.</p> <p>Any nest that appears to be at risk, reported to park biologist from field when possible.</p> <p>AMOY—Mark nest in an unobtrusive manner and establish a 10 square foot full recreational closure around the nest if nest in area subject to ORV or pedestrian traffic.</p> <p>Generally, nests found in the dunes are not posted because there is concern that predators might learn to associate posts with nests.</p> <p>Areas remain closed until chicks fledge or are lost, typically August 15.</p>	<p>PIPL—Expand full recreational closures to provide for a 150-foot buffer around nests (same as alternative A).</p> <p>Place predator exclosures over nest after 4th egg is laid if conditions allow (same as alternative A).</p> <p>Areas remain closed until chicks fledge or are lost (same as alternative A).</p> <p>Any nest that appears to be at risk, reported to park biologist from field when possible (same as alternative A).</p> <p>AMOY—Mark nest in an unobtrusive manner and establish a 10 square foot full recreational closure around the nest if nest in area subject to ORV or pedestrian traffic (same as alternative A).</p> <p>Generally, nests found in the dunes are not posted because there is concern that predators might learn to associate posts with nests (same as alternative A).</p> <p>Establish no camping areas in areas where a high nest concentration (3 or more between 2 ramps) occurs in dune habitats.</p> <p>Areas remain closed until chicks fledge or are lost, typically August 15 (same as alternative A).</p>	<p>PIPL—Expand full recreational closures to provide for a 150-foot buffer around nests (same as alternative A).</p> <p>Place predator exclosures over nest after 4th egg is laid if conditions allow (same as alternative A).</p> <p>Areas remain closed until chicks fledge or are lost (same as alternative A).</p> <p>Any nest that appears to be at risk, reported to park biologist from field when possible (same as alternative A).</p> <p>Increase enforcement of public compliance with closures.</p> <p>AMOY—Mark nest in an unobtrusive manner and establish a 10 square foot full recreational closure around the nest if nest in area subject to ORV or pedestrian traffic (same as alternative A).</p> <p>Establish ORV closure in any area between two ramps that has 3 or more nests; ORV traffic routed to backroad.</p> <p>Generally, nests found in the dunes are not posted because there is concern that predators might learn to associate posts with nests (same as alternative A).</p> <p>Areas remain closed until chicks fledge or are lost, typically August 15 (same as alternative A).</p>	<p>PIPL—Expand full recreational closures to provide for a 150-foot buffer around nests (same as alternative A).</p> <p>Place predator exclosures over nest after 4th egg is laid if conditions allow (same as alternative A).</p> <p>Areas remain closed until chicks fledge or are lost (same as alternative A).</p> <p>Any nest that appears to be at risk, reported to park biologist from field when possible (same as alternative A).</p> <p>AMOY—Mark nest in an unobtrusive manner and establish a 10 square foot full recreational closure around the nest if nest in area subject to ORV or pedestrian traffic (same as alternative A).</p> <p>Generally, nests found in the dunes are not posted because there is concern that predators might learn to associate posts with nests (same as alternative A).</p> <p>Areas remain closed until chicks fledge or are lost, typically August 15 (same as alternative A).</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	<p>CWB—Expand full recreational closure to provide for a 150-foot buffer from all nests.</p> <p>WIPL—No closures outside of other existing bird closures.</p>	<p>CWB—Expand full recreational closure to provide for a 300-foot buffer from all nests.</p> <p>WIPL—Post WIPL nests or scrapes found outside existing closures on NCB and SCB.</p>	<p>CWB—Expand full recreational closure to provide for a 300-foot buffer around all nests if a backroad is present, and a 150-foot buffer if there is no backroad.</p> <p>Increase enforcement of public compliance with closures.</p> <p>WIPL—Post WIPL nests or scrapes found outside existing closures on NCB and SCB (same as alternative B).</p>	<p>CWB—Expand full recreational closure to provide for a 150-foot buffer from all nests (same as alternative A).</p> <p>WIPL—Post WIPL nests or scrapes found outside existing closures on NCB and SCB (same as alternative B).</p>
Bird—Unfledged Chicks*	Species Survey			
	<p>PIPL—Survey brood at least once every 2 days. Record (1) date & time; (2) nest/brood number; (3) location of brood; (4) number of chicks; (5) brood age (this is known from other data on hatch date); (6) brood behavior [foraging, resting/brooding, disturbed (record source), other]; (7) presence and behavior of adults [foraging, brooding, resting, disturbed (record source), territorial flight, territorial encounter, distraction display or other defensive behavior toward predator or pedestrian, courtship, other behavior (describe)]; (8) presence or evidence of potential predators, humans, or ORVs within 300 feet and location relative to the brood; (9) cause of chick loss, if carcass found and source of mortality apparent.</p> <p>Survey of nesting birds and chicks ceases when all chicks have fledged or are lost.</p>	<p>PIPL—Survey brood 7 days per week. Record the same information as alternative A.</p>	<p>IPL—Survey brood 7 days per week. Record the same information as alternative A (same as alternative B).</p>	<p>PIPL—Survey brood 7 days per week on NCB and SCB; at least once per week elsewhere. Record the same information as alternative A.</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	<p>AMOY—Survey brood at least every 2 to 3 days. Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey brood at least once every 2 days when PIPL monitoring occurs. Surveys cease when all chicks have fledged or are lost.</p> <p>WIPL—No survey.</p>	<p>AMOY—Survey brood 7 days per week. Record location and habitat of adults and chicks and signs of potential predators or threats (e.g., deep vehicle tracks, which prevent chicks from accessing the beach). Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey brood 7 days per week and record productivity. Surveys cease when all chicks have fledged or are lost.</p> <p>WIPL—Survey brood if observed in existing PIPL closure.</p>	<p>AMOY—Survey brood at least 3 to 5 days per week. Increase the law enforcement presence for additional closures and resource protection. Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey brood every 3 to 5 days and record productivity. Surveys cease when all chicks have fledged or are lost.</p> <p>WIPL—Survey brood if observed in existing PIPL closure (same as alternative B).</p>	<p>AMOY—Survey brood at least once every 2 days on NCB and SCB. Surveys cease when all chicks have fledged or are lost.</p> <p>CWB—Survey brood at least once every 2 days when PIPL monitoring occurs. Surveys cease when all chicks have fledged or are lost (same as alternative A).</p> <p>WIPL—No survey (same as alternative A).</p>
Bird—Unfledged Chicks*	Species Management			
	<p>PIPL—After nest hatches, when a chick is found using the ocean beach, expand buffer to include a 600-foot ORV closure around each brood. ORV routed to backroad or, if no road, park would consider an escort. An escort program may be used on a case-by-case basis to maintain access to Portsmouth Village or areas with no backroad access if staffing allows. Closures removed when last chick is fledged or is lost.</p>	<p>PIPL—After nest hatches, when a chick is found using the ocean beach, expand buffer to include a 600-foot ORV closure around each brood. ORV routed to backroad or, if no road, park would consider an escort. An escort program may be used on a case-by-case basis to maintain access to Portsmouth Village or areas with no backroad access if staffing allows (same as alternative A).</p> <p>Establish a 2-mile full recreational closure at north end of SCB from first nest hatch until last chick has fledged or is lost.</p> <p>Closures removed when last chick is fledged or is lost (same as alternative A).</p>	<p>PIPL—After nest hatches, when a chick is found using the ocean beach, expand buffer to include a 600-foot ORV closure around each brood. ORV routed to backroad or, if no road, park would consider an escort. An escort program may be used on a case-by-case basis to maintain access to Portsmouth Village or areas with no backroad access if staffing allows (same as alternative A).</p> <p>Establish a 2-mile ORV closure at north end of SCB from first nest hatch until last chick has fledged or is lost.</p> <p>Increase enforcement of public compliance with closures. Closures removed when last chick is fledged or is lost (same as alternative A).</p>	<p>PIPL—After nest hatches, when a chick is found using the ocean beach, expand buffer to include a 600-foot ORV closure around each brood. ORV routed to backroad or, if no road, park would consider an escort. An escort program may be used on a case-by-case basis to maintain access to Portsmouth Village or areas with no backroad access if staffing allows (same as alternative A).</p> <p>Establish a 2-mile ORV closure at north end of SCB from first nest hatch until last chick has fledged or is lost (same as alternative C).</p> <p>Increase enforcement of public compliance with closures (same as alternative C). Closures removed when last chick is fledged or is lost (same as alternative A).</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	<p>AMOY—Establish ramp-to-ramp ORV closures if chicks present on the beach (route ORV traffic routed to backroad via designated ramps) unless no backroad is present, then ORV would be allowed at 15 mph, with signs warning operators of flightless chicks in the area.</p> <p>Closed areas reopened to ORV after last chick has fledged or is lost.</p> <p>CWB—Establish ORV closure that provides at least a 150-foot buffer around broods when chicks present at Cape Lookout Point Beach. In other areas, route traffic around ORV closures if chicks are in danger of being run over.</p> <p>WIPL—No closures outside of other existing bird closures.</p>	<p>AMOY—Establish ramp-to-ramp ORV closures if chicks present on the beach (route ORV traffic to backroad via designated ramps) unless no backroad is present, then ORV would be allowed at 15 mph, with signs warning operators of flightless chicks in the area (same as alternative A).</p> <p>Adjust ORV closures based on chick movement, providing a minimum 300-foot buffer around brood. Closures would move with chicks.</p> <p>Closed areas reopened to ORV after last chick has fledged or is lost (same as alternative A).</p> <p>CWB—Establish ORV closure that provides at least a 150-foot buffer around broods; ORV traffic allowed in a corridor along shoreline, as long as a 150-foot buffer is maintained. Once chicks are mobile, buffer expands to 600 feet and closure increases accordingly.</p> <p>WIPL—Post areas with WIPL chick found outside existing closures on NCB and SCB.</p>	<p>AMOY—Establish ramp-to-ramp ORV closures if chicks present on the beach (route ORV traffic to backroad via designated ramps) unless no backroad is present, then ORV would be allowed at 15 mph, with signs warning operators of flightless chicks in the area or an escort would be considered, dependent on the conditions.</p> <p>Adjust ORV closures based on chick movement, providing a minimum 300-foot buffer around brood. Closures would move with chicks (same as alternative B).</p> <p>Closed areas reopened to ORV after last chick has fledged or is lost (same as alternative A).</p> <p>Increase enforcement of public compliance with closures.</p> <p>CWB—Establish ORV closure that provides at least a 150-foot buffer around broods; ORV traffic allowed in a corridor along shoreline, as long as a 150-foot buffer is maintained. Once chicks are mobile, buffer expands to 600 feet and closure increases accordingly (same as alternative B).</p> <p>Increase enforcement of public compliance with closures.</p> <p>WIPL—Post areas with WIPL chick found outside existing closures on NCB and SCB (same as alternative B).</p>	<p>AMOY—Establish ramp-to-ramp ORV closures if chicks present on the beach (route ORV traffic to backroad via designated ramps) unless no backroad is present, then ORV would be allowed at 15 mph, with signs warning operators of flightless chicks in the area (same as alternative A).</p> <p>Adjust ORV closures based on chick movement, providing a minimum 300-foot buffer around brood. Closures would move with chicks (same as alternative B).</p> <p>Closed areas reopened to ORV after last chick has fledged or is lost (same as alternative A).</p> <p>CWB—Establish ORV closure that provides at least a 150-foot buffer around broods when chicks present at Cape Lookout Point Beach. In other areas, route traffic around ORV closures if chicks are in danger of being run over (same as alternative A).</p> <p>WIPL—Post areas with WIPL chick found outside existing closures on NCB and SCB (same as alternative B).</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
Bird—Non-breeding (migrating / wintering)	Species Survey			
	<p>PIPL—Survey entire seashore non-breeding population once per month.</p> <p>Coordinate with Cape Hatteras Natl. Seashore to conduct simultaneous surveys or receive survey data from Portsmouth Island during winter, since, based on past banding data, wintering birds move across Ocracoke Inlet.</p> <p>Send data on winter birds to NCWRC.</p> <p>Record: (1) date; (2) weather variables [air temperature, wind speed and direction, visibility, % cloud cover (est. by eye), precipitation; (3) tidal stage (hours after high tide); (5) number of birds; (5) habitat; (6) behavior of majority of birds in flock [foraging, resting, disturbed (record source), other]; and (7) check for band combination of any banded birds, using reporting protocols developed by staff for band color and location.</p> <p>AMOY—No survey of non-breeding individuals.</p> <p>CWB—No surveys occur because species of interest typically not present during winter months.</p> <p>WIPL—No surveys of non-breeding individuals.</p>	<p>PIPL—Survey entire seashore non-breeding population once per month (same as alternative A).</p> <p>Coordinate with Cape Hatteras Natl. Seashore to conduct simultaneous surveys or receive survey data from Portsmouth Island during winter, since, based on past banding data, wintering birds move across Ocracoke Inlet (same as alternative A).</p> <p>Send data on winter birds to NCWRC (same as alternative A).</p> <p>Record: (1) date; (2) weather variables [air temperature, wind speed and direction, visibility, % cloud cover (est. by eye), precipitation; (3) tidal stage (hours after high tide); (5) number of birds; (5) habitat; (6) behavior of majority of birds in flock [foraging, resting, disturbed (record source), other]; and (7) check for band combination of any banded birds, using reporting protocols developed by staff for band color and location (same as alternative A).</p> <p>AMOY—Coordinate survey non-breeding AMOY activity with non-breeding PIPL surveys.</p>	<p>PIPL—Survey entire seashore non-breeding population once per month (same as alternative A).</p> <p>Coordinate with Cape Hatteras Natl. Seashore to conduct simultaneous surveys or receive survey data from Portsmouth Island during winter, since, based on past banding data, wintering birds move across Ocracoke Inlet (same as alternative A).</p> <p>Send data on winter birds to NCWRC (same as alternative A).</p> <p>Record: (1) date; (2) weather variables [air temperature, wind speed and direction, visibility, % cloud cover (est. by eye), precipitation; (3) tidal stage (hours after high tide); (5) number of birds; (5) habitat; (6) behavior of majority of birds in flock [foraging, resting, disturbed (record source), other]; and (7) check for band combination of any banded birds, using reporting protocols developed by staff for band color and location (same as alternative A).</p> <p>Increase the law enforcement presence for resource protection.</p> <p>AMOY—Coordinate survey non-breeding AMOY activity with non-breeding PIPL surveys (same as alternative B).</p>	<p>PIPL—Survey entire seashore non-breeding population once per month (same as alternative A).</p> <p>Coordinate with Cape Hatteras Natl. Seashore to conduct simultaneous surveys or receive survey data from Portsmouth Island during winter, since, based on past banding data, wintering birds move across Ocracoke Inlet (same as alternative A).</p> <p>Send data on winter birds to NCWRC (same as alternative A).</p> <p>Record: (1) date; (2) weather variables [air temperature, wind speed and direction, visibility, % cloud cover (est. by eye), precipitation; (3) tidal stage (hours after high tide); (5) number of birds; (5) habitat; (6) behavior of majority of birds in flock [foraging, resting, disturbed (record source), other]; and (7) check for band combination of any banded birds, using reporting protocols developed by staff for band color and location (same as alternative A).</p> <p>AMOY—No survey of non-breeding individuals (same as alternative A).</p>

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KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	REKN—No survey of non-breeding individuals.	REKN—Survey, following international shorebird survey protocols.	REKN—Survey, following international shorebird survey protocols (same as alternative B).	REKN—Survey in spring and fall on NCB and SCB following International shorebird survey protocols on frequency and timing.
Bird—Non-breeding (migrating / wintering)	Species Management			
	Closures not specifically implemented for wintering/ migrating shorebird protection. Permanent ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit are maintained.	Permanent ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit would be maintained. Maintain full recreational closures for all key PIPL wintering habitats as determined by the park biologist. Maintain 2-mile ORV closure at north end of SCB.	Permanent ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit would be maintained. Maintain full recreational closures for all key PIPL wintering habitats as determined by the park biologist. Maintain 2-mile ORV closure at north end of SCB (same as alternative B). Increase enforcement of public compliance with closures.	Closures not specifically implemented for wintering/ migrating shorebird protection. Permanent ORV closures at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit are maintained (same as alternative A.).
Sea Turtle	Species Survey			
	Jun 01–Aug 15 survey for crawls/nests before 12:00 PM daily on SCB and NCB; Shackleford Banks 2-3 days per week; Middle Core Banks monitored irregularly (difficult access). Monitoring procedures and data collection follow the monitoring and reporting guidelines in the Handbook for Sea Turtle Volunteers in North Carolina (NCWRC 2002) and the USFWS Index Nesting Beach Survey Protocol. Before Jun 1, park staff conduct PIPL monitoring and, if possible, note any turtle crawls/nests. Record (1) date & time; (2) species, if known; (3) whether it is a false or nesting crawl; (4) sequential nest number; (5) whether nest was relocated, original and relocation site	May 01–Aug 31 survey for crawls/nests before 12:00 PM daily on SCB & NCB; Shackleford Banks 3-4 days per week; Middle Core Banks monitored irregularly (difficult access). After August 31, monitoring of active nests continues until hatching occurs. Monitoring procedures and data collection follow the monitoring and reporting guidelines in the Handbook for Sea Turtle Volunteers in North Carolina (NCWRC 2002) and the USFWS Index Nesting Beach Survey Protocol. Before May 1 park staff conduct PIPL monitoring and, if possible, note any turtle crawls/nests.	Jun 01–Aug 15 survey for crawls/nests before 12:00 PM daily on SCB and NCB; Shackleford Banks 2-3 days per week; Middle Core Banks monitored irregularly (difficult access). Monitoring procedures and data collection follow the monitoring and reporting guidelines in the Handbook for Sea Turtle Volunteers in North Carolina (NCWRC 2002) and the USFWS Index Nesting Beach Survey Protocol (same as alternative A). Before Jun 1, park staff conduct PIPL monitoring and, if possible, note any turtle crawls/nests (same as alternative A). Information collected is the same as detailed in alternative A.	Jun 01–Aug 15 survey for crawls/nests before 12:00 PM daily on SCB and NCB; Shackleford Banks 2-3 days per week; Middle Core Banks monitored irregularly (difficult access). Monitoring procedures and data collection follow the monitoring and reporting guidelines in the Handbook for Sea Turtle Volunteers in North Carolina (NCWRC 2002) and the USFWS Index Nesting Beach Survey Protocol (same as alternative A). Before Jun 1, park staff conduct PIPL monitoring and, if possible, note any turtle crawls/nests (same as alternative A). Information collected is the same as detailed in alternative A.

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	names, and coordinates of original and relocation sites in Lat/Long; (6) distance from nest to tideline, in meters; (7) date when nest excavation conducted; (8) date(s) of nest overwash; (9) sources of egg or whole nest loss, if apparent; and (9) geographic coordinates of false crawls when first found. Conduct a nest excavation inventory to determine nest success after hatching.	Information collected is the same as detailed in alternative A.		
Sea Turtle	<p>Species Management</p> <p><u>Nest Protection:</u> Each located nest is immediately marked with stakes. 50 days after nest laid, funnel shaped ORV closure established from nest to 15 feet below high tide line. ORV closure is 30 feet wide at nest; 60 feet wide below high tide line, with minimum 10-foot buffer duneward of nest. If 10-foot minimum buffer is not possible, ramp-to-ramp ORV closure is established (vehicles routed around nest via backroad). ORV closure removed after nest hatches.</p> <p><u>Nest Relocation:</u> Relocate nests laid at or below high tide line or in areas where they are likely to be washed away or are in danger of erosion. According to USFWS recommendations. 3 nest relocation areas (up to 1 mile in length) are designated on SCB and NCB where ORV traffic is prohibited beginning 50 days after first nest relocated to area. Nests are relocated to the nearest designated area. No ORVs are allowed on Shackleford Banks, so nests are relocated to the nearest suitable habitat.</p>	<p><u>Nest Protection:</u> Each located nest is immediately marked with stakes, establishing a 30 square foot full recreational closure around the nest. 50 days after nest laid, funnel shaped ORV closure established from nest closure to 15 feet below high tide line. ORV closure is 30 feet wide at nest; 60 feet wide below high tide line, with minimum 10-foot buffer duneward of nest. If 10-foot minimum buffer is not possible, ramp-to-ramp ORV closure is established (vehicles routed around nest via backroad). ORV closure removed after nest hatches (same as alternative A).</p> <p><u>Nest Relocation:</u> Same as alternative A.</p> <p><u>Nest Excavations:</u> Same as alternative A.</p> <p><u>Predator Management:</u> Same as alternative A.</p> <p><u>Light Management:</u> Camping and beachfires prohibited within 600 feet of any nest closure to prevent disturbance of</p>	<p><u>Nest Protection:</u> Each located nest is immediately marked with stakes (same as alternative A). 50 days after nest laid, funnel shaped full recreational closure established from nest to 15 feet below high tide line. Full recreational closure is 30 feet wide at nest; 60 feet wide below high tide line, with minimum 10-foot buffer duneward of nest. If 10-foot minimum buffer is not possible, ramp-to-ramp ORV closure is established (vehicles routed around nest via backroad). Full recreational closure removed after nest hatches (same as alternative A). Increase law enforcement presence for additional closures and resource protection.</p> <p><u>Nest Relocation:</u> Same as alternative A.</p> <p><u>Nest Excavations:</u> Same as alternative A.</p> <p><u>Predator Management:</u> Same as alternative A.</p> <p><u>Light Management:</u></p>	<p><u>Nest Protection:</u> Same as alternative A.</p> <p><u>Nest Relocation:</u> Same as alternative A.</p> <p><u>Nest Excavations:</u> Same as alternative A.</p> <p><u>Predator Management:</u> Same as alternative A.</p> <p><u>Light Management:</u> Same as alternative A.</p>

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
	<p>Nests are relocated within 12 hrs after eggs laid or 14 days after the nest was laid.</p> <p><u>Nest Excavations:</u></p> <p>Nest excavated 5th day after a major hatch (indicated by distinctive hatchling tracks), 10 days after depression forms, or 75 days after nest was laid if no sign of hatching.</p> <p>If nest outside of a designated relocation area, the ORV closure would be removed after excavation.</p> <p><u>Predator Management:</u></p> <p>Screens or cages used to protect nests and prevent egg loss to raccoons.</p> <p><u>Light Management:</u></p> <p>Camping and campfires prohibited in nest relocation areas to prevent disturbance of hatchlings from artificial lights.</p> <p>Park encourages concessionaires and people staying in park cabins to minimize use of outdoor lights.</p> <p>Nests in locations deemed vulnerable to light pollution, 2 foot high plywood barriers erected behind and to the sides of the nest 10 days before estimated hatch date.</p> <p>Fireworks are prohibited within the seashore.</p>	<p>to prevent disturbance of hatchlings from artificial lights.</p> <p>Use of artificial light prohibited within 600 feet of any nest closure.</p> <p>Park encourages concessionaires and people staying in park cabins to minimize use of outdoor lights (same as alternative A).</p> <p>Nests in locations deemed vulnerable to light pollution, 2 foot high plywood barriers erected behind and to the sides of the nest 10 days before estimated hatch date (same as alternative A).</p> <p>Fireworks are prohibited within the seashore (same as alternative A).</p> <p>Prohibit night driving from Ramp 41 B to Ramp 44 from 8:00 pm to 6:00 am May 1 until last nest hatches.</p>	<p>Camping and beachfires prohibited within 600 feet of any nest closure to prevent disturbance of hatchlings from artificial lights (same as alternative B).</p> <p>Use of artificial light prohibited within 600 feet of any nest closure (same as alternative B).</p> <p>Park encourages concessionaires and people staying in park cabins to minimize use of outdoor lights (same as alternative A).</p> <p>Nests in locations deemed vulnerable to light pollution, 2 foot high plywood barriers erected behind and to the sides of the nest 10 days before estimated hatch date (same as alternative A).</p> <p>Fireworks are prohibited within the seashore (same as alternative A).</p>	

TABLE 1: ALTERNATIVES ELEMENTS SUMMARY—SPECIES SURVEY AND MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
KEY: AMOY—American oystercatcher; CWB—colonial waterbird; NCB—North Core Banks; PIPL—piping plover; REKN—red knot; SCB—South Core Banks; WIPL—Wilson's Plover				
Seabeach Amaranth	Species Survey Conduct annual survey in late-July or early-August to record plant numbers and distribution and identify areas for ORV closure. Survey habitat but concentrate on where plants have been found before. Surveys conducted in all areas of suitable habitat and results mapped using GIS.	May 1 (or before) identify potential habitat as defined by historic and extant populations within past 3 years; June 1 begin monitoring habitat outside existing bird closures 1-2 days per week for seedlings/juvenile plants. Conduct annual survey in late-July or early-August to record plant numbers and distribution and identify areas for ORV closure. Survey habitat but concentrate on where plants have been found before. Surveys conducted in all areas of suitable habitat and results mapped using GIS (same as alternative A).	June 1 begin monitoring habitat outside existing bird closures 1-2 days per week for seedlings/juvenile plants. Conduct annual survey in late-July or early-August to record plant numbers and distribution and identify areas for ORV closure. Survey habitat but concentrate on where plants have been found before. Surveys conducted in all areas of suitable habitat and results mapped using GIS (same as alternative A).	June 1 begin monitoring habitat outside existing bird closures 1-2 days per week for seedlings/juvenile plants (same as alternative C). Conduct annual survey in late-July or early-August to record plant numbers and distribution and identify areas for ORV closure. Survey habitat but concentrate on where plants have been found before. Surveys conducted in all areas of suitable habitat and results mapped using GIS (same as alternative A).
Seabeach Amaranth	Species Management Establish ORV closure around all emergent plants. Size of closure based on best professional judgment but with at least a minimum 20-foot buffer around plant. ORV closure remains in place until the end of the growing season (late fall/early winter or earlier due to overwash).	Establish ORV closure around all emergent plants. Size of closure based on best professional judgment but with at least a minimum 20-foot buffer around plant (same as alternative A). May 1 to end of growing season, close historic habitat (past 3 years) to ORV traffic providing 30-foot buffer around historic plant locations. After August survey, open areas where no plants occur. ORV closure remains in place until the end of the growing season (late fall/early winter or earlier due to overwash) (same as alternative A). Survey bird/turtle closures before reopening to ORV traffic; no tent camping in ORV closure areas.	Establish ORV closure around all emergent plants. Size of closure based on best professional judgment but with at least a minimum 30-foot buffer around plant. Survey bird/turtle closures prior to reopening to ORV traffic, also no tent camping in ORV closure areas (same as alternative B). Open closed area at end of growing season.	Establish ORV closure around all emergent plants. Size of closure based on best professional judgment but with at least a minimum 30-foot buffer around plant (same as alternative C). Survey bird/turtle closures prior to reopening to ORV traffic, also no tent camping in ORV closure areas (same as alternative B). Open closed area at end of growing season (same as alternative C).

TABLE 2: ALTERNATIVES ELEMENTS SUMMARY—RECREATION AND OTHER SEASHORE MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Permanent ORV Closures	ORV prohibited from Shackleford Banks, Portsmouth Flats, interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit.			
Seasonal Full Recreational Closures	<p>April 01. Full recreational closures established for all active piping plover nesting areas. Closures can be expanded to ensure a 150-foot buffer around mating pairs and/or nests and 600 feet around each brood.</p> <p>April 15. Full recreational closures established in all active CWB nesting areas. Closures can be expanded to ensure a 150-foot buffer around all nests.</p>	<p>Maintain 2-mile ORV closure at north end of SCB from first nest hatch until last chick has fledged or is lost and throughout the non-breeding season.</p> <p>April 01. Full recreational closures established for all active piping plover nesting areas. Closures can be expanded to ensure a 150-foot buffer around mating pairs and/or nests and 600 feet around each brood (same as alternative A).</p> <p>April 15. Full recreational closures established in all active CWB nesting areas. Closures can be expanded to ensure a 300-foot buffer around all nests.</p>	<p>April 01. Full recreational closures established for all active piping plover nesting areas. Closures can be expanded to ensure a 150-foot buffer around mating pairs and/or nests and 600 feet around each brood (same as alternative A).</p> <p>April 15. Full recreational closures established in all active CWB nesting areas. Closures can be expanded to ensure a 150- to 300-foot buffer around all nests.</p> <p>30 foot full recreational closures established around turtle nests.</p>	<p>April 01. Full recreational closures established for all active, historic and potential new piping plover nesting areas as determined by a qualified staff biologist. Closures can be expanded to ensure a 150-foot buffer around mating pairs and/or nests and 600 feet around each brood.</p> <p>April 15. Full recreational closures established in all active CWB nesting areas. Closures can be expanded to ensure a 1500-foot buffer around all nests (same as alternative A).</p>
Seasonal ORV Closures ³⁴	<p>April 15. Establish ORV closures in historic least tern and black skimmer nesting areas.</p> <p>Establish ramp-to-ramp ORV closures if AMOY chicks present on beach (unless no backroad).</p> <p>Establish ORV closure when CWB chicks present at Cape Lookout Point beach.</p> <p>Turtle nest relocation areas closed to ORV.</p> <p>30 foot closures established around turtle nests.</p> <p>20 foot closures established around</p>	<p>Apr 01 to Aug 30 restrict all ORV, from Middle Core Banks and "Ophelia Banks."</p> <p>Establish ramp-to-ramp ORV closures if AMOY chicks present on beach (unless no backroad) and adjust closure, providing a minimum 300-foot buffer around brood.</p> <p>Establish ORV closure providing at a minimum 150-foot buffer around CWB broods, once mobile buffer expands to 600 feet.</p> <p>Turtle nest relocation areas closed to ORV (same as alternative A).</p>	<p>Apr 01 to Aug 30 restrict all ORV, from Middle Core Banks and "Ophelia Banks" (same as alternative B). Maintain 2-mile ORV closure at north end of SCB from first nest hatch until last chick has fledged or is lost and during winter migration.</p> <p>ORV closures may be established in any area between two ramps that has 3 or more AMOY pairs displaying courtship/mating behavior and/or if AMOY chicks present on beach (unless no backroad) and adjust closure, providing a minimum 300-foot buffer</p>	<p>Apr 01 to Aug 30 restrict all ORV, from Middle Core Banks and "Ophelia Banks" (same as alternative B). Maintain 2-mile ORV closure at north end of SCB from first nest hatch until last chick has fledged or is lost.</p> <p>Establish ramp-to-ramp ORV closures if AMOY chicks present on beach (unless no backroad) and adjust closure, providing a minimum 300-foot buffer around brood (same as alternative B).</p> <p>Establish ORV closure when CWB chicks present at Cape Lookout Point beach (same as alternative A).</p>

³ All seasonal ORV closures and full recreational closures would route ORVs and/or visitors to the backroad, where present. If no backroad were present, in some cases access would be maintained (i.e., American oystercatcher chicks on beach and no backroad present, then ORV would be allowed at 15 mph).

⁴ Seasonal ORV closures and full recreational closures remain in place, for birds, until all chicks have fledged or are lost or, for the sea turtle relocation areas, until the last turtle nest has hatched.

TABLE 2: ALTERNATIVES ELEMENTS SUMMARY—RECREATION AND OTHER SEASHORE MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	seabeach amaranth emergent plants.	30 foot closures established around turtle nests. 20 foot closures established around seabeach amaranth emergent plants and 30 foot closure established around historic plant locations.	around brood. Establish ORV closure providing at a minimum 150-foot buffer around CWB broods, once mobile buffer expands to 600 feet (same as alternative B). Turtle nest relocation areas closed to ORV (same as alternative A). 30 foot closures established around seabeach amaranth emergent plants.	(same as alternative A). Turtle nest relocation areas closed to ORV (same as alternative A). 30 foot closures established around turtle nests (same as alternative A). 30 foot closures established around seabeach amaranth emergent plants (same as alternative C).
Public Access	24 hour public access is maintained in all areas not closed to recreation.			
Pedestrian Use	Pedestrian traffic permitted in ORV closures but not in full recreational closures.			
Pets	36 CFR 2.15(2) Pets: pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Pets prohibited from full recreational closure areas.	36 CFR 2.15(2) Pets: pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Pets prohibited from seashore Apr 15-Aug 31. Outside of those dates, pets prohibited from full recreational closure areas.	36 CFR 2.15(2) Pets: pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Pets prohibited from full recreational closure areas. Increase enforcement and signage of pet leash regulation.	36 CFR 2.15(2) Pets: pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Pets prohibited from full recreational closure areas (same as alternative A).
Other Recreational Management	No regulations regarding kite flying. 36 CFR 2.38 Explosives: all fireworks are prohibited in the seashore at all times.	Kite flying prohibited Apr 01-Aug 31. 36 CFR 2.38 Explosives: all fireworks are prohibited in the seashore at all times (same as alternative A).	Kite flying prohibited Apr 01-Aug 31 (same as alternative B). 36 CFR 2.38 Explosives: all fireworks are prohibited in the seashore at all times (same as alternative A).	No regulations regarding kite flying (same as alternative A). 36 CFR 2.38 Explosives: all fireworks are prohibited in the seashore at all times (same as alternative A).
Camping		No camping within 600 feet of any turtle closure and/or areas where a high AMOY nest concentration (3 or more between two ramps) occurs.	No camping within 600 feet of any turtle closure and/or areas where a high AMOY nest concentration (3 or more between two ramps) occurs (same as alternative B).	
Night Driving	No special regulations for nighttime driving.	May 1 until last turtle nest hatches, prohibit night driving from Ramp 41B to Ramp 44 from 8:00 pm to 6:00 am. Encourage use of backroad for night driving elsewhere.	No special regulations for nighttime driving (same as alternative A). Provide law enforcement to monitor compliance with existing closures at night.	No special regulations for nighttime driving (same as alternative A).
Vehicle Escorts	If staff available, a limited escort program may be used on a case-by-case basis around bird closures to maintain access to Portsmouth Village, Cape Lookout Point, or areas with no backroad access. Escorts would be led by trained species surveyors. Limit to 25 vehicles or less. Escorts occur once in the morning and once in the late afternoon.			
Research	Ongoing research at the seashore would include: Evaluating the Consequences of Predator Removal for Endangered Species Management at Cape Lookout National Seashore			

TABLE 2: ALTERNATIVES ELEMENTS SUMMARY—RECREATION AND OTHER SEASHORE MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	Visitor and ORV Use and Impact Assessment Study Measure Impact of Off-Road Vehicles on Beach Birds			
Staffing and Costs	<p>Interpretation: 13% of Chief Ranger 25% of: 2 full-time interpreters, 2 seasonal interpreters, one park guide, and 1 6-month SCA intern.</p> <p>Interpretation Costs for Species Protection = \$76,088</p>	<p>Interpretation: 13% of Chief Ranger 25% of: 2 full-time interpreters, 3 seasonal interpreters, one park guide, and 1 6-month SCA intern.</p> <p>Additional cost = \$22,000 Existing cost = \$76,088 Interpretation Costs for Species Protection = \$98,088</p>	<p>Interpretation: 13% of Chief Ranger 25% of: 2 full-time interpreters, 5 seasonal interpreters, one park guide, and 1 6-month SCA intern.</p> <p>Additional cost = \$44,000 Existing cost = \$76,088 Interpretation Costs for Species Protection = \$118,088</p>	<p>Interpretation: 13% of Chief Ranger 25% of: 2 full-time interpreters, 2 seasonal interpreters, one park guide, and 1 6-month SCA intern. Education / Entrance Stations: 4, 6-month seasonal interpreters stationed 7 days per week at Long Point and Great Island ferry landings plus cabin rental, maintenance support, and other costs.</p> <p>Additional cost = \$121,000 Existing cost = \$76,088 Interpretation Costs for Species Protection = \$197,088</p>
	<p>Resource Management (RM): 50% of Chief Ranger 1 biologist, 1 seasonal employee, and two 12-week SCA interns.</p> <p>Staffing cost = \$130,000 Other costs (SCA housing, supplies, etc.) = \$25,500 RM Costs for Species Protection = \$155,500</p>	<p>Resource Management (RM): 50% of Chief Ranger Upgrade current biologist, add 1 biologist, 1 seasonal employee, three 6-month SCA interns.</p> <p>Staffing cost = \$131,500 Existing cost = \$130,000 Other costs = \$58,000 Existing other = \$25,500 RM Costs for Species Protection = \$345,000 One time costs for cabin construction, 1 boat and 4 ATVs = \$203,000.</p>	<p>Resource Management (RM): 50% of Chief Ranger Upgrade current biologist, add 1 biologist, 1 seasonal employee, and three 6-month SCA interns.</p> <p>Staffing cost = \$131,500 Existing cost = \$130,000 Other costs = \$58,000 Existing other = \$25,500 RM Costs for Species Protection (same as alternative B) = \$345,000 One time costs for cabin construction, 1 boat and 4 ATVs = \$203,000.</p>	<p>Resource Management (RM): 50% of Chief Ranger 1 biologist, 2 seasonal employees, and 2 12-week SCA interns, 2 6-month SCA interns.</p> <p>Staffing cost = \$103,000 Existing cost = \$130,000 Existing other = \$25,500 RM Costs for Species Protection = \$258,500 One time cost for 2 ATVs = \$9,000</p>

TABLE 2: ALTERNATIVES ELEMENTS SUMMARY—RECREATION AND OTHER SEASHORE MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	<p>Law Enforcement (LE): 10% of Chief Ranger 1 Supervisor, 1 full-time Ranger, 2 seasonal Rangers Full LE program cost = \$360,000. Staffing costs devoted to species protection = \$186,425 plus other costs (supplies, vehicles, boats) = \$60,300. Education / Entrance Stations (Performed by law enforcement staff): None. Total additional annual LE cost = None. Total annual LE costs allocated to species protection = \$246,725</p>	<p>Law Enforcement (LE): 10% of Chief Ranger 1 Supervisor, 1 full-time Ranger, 2 seasonal Rangers, 1 10-month permanent law enforcement position Education / Entrance Stations (Performed by law enforcement staff): Add 2, 6-month seasonal law enforcement positions stationed 4 days per week at Long Point and Great Island ferry landings. Total additional annual LE cost = \$140,300. Total annual LE costs allocated to species protection = \$387,025</p>	<p>Law Enforcement (LE): 10% of Chief Ranger 1 Supervisor, 1 full-time Ranger, 2 seasonal Rangers, 3 10-month permanent law enforcement position One-time cost of \$38,000 for 2 ATVs and 7 radios. Education / Entrance Stations (Performed by law enforcement staff): Add 4, 6-month seasonal law enforcement positions stationed 7 days per week at Long Point and Great Island ferry landings. Total additional annual LE cost = \$377,100. Additional one-time cost = \$38,000. Total annual LE costs allocated to species protection = \$623,825</p>	<p>Law Enforcement (LE): 10% of Chief Ranger 1 Supervisor, 1 full-time Ranger, 2 seasonal Rangers Total additional annual LE cost = None Total annual LE costs devoted to species protection = \$246,725</p>
	<p>Total Cost (Interpretation +RM + LE) = \$478,313.</p>	<p>Total Additional Cost Year 1: \$554,800 (Total cost \$1,033,113) Total Additional Cost Year 2: \$351,800 (Total cost \$830,113) Total Additional Cost Year 3: \$351,800 (Total cost \$830,113)</p>	<p>Total Additional Cost Year 1: \$813,600 (Total cost \$1,291,913) Total Additional Cost Year 2: \$610,600 (Total cost \$1,088,913) Total Additional Cost Year 3: \$610,600 (Total cost \$1,088,913)</p>	<p>Total Additional Cost Year 1: \$233,000 (Total cost \$711,313) Total Additional Cost Year 2: \$224,000 (Total cost \$702,313) Total Additional Cost Year 3: \$224,000 (Total cost \$702,313)</p>
Compliance	<p>Day Enforcement Total Program: Monitor compliance up to 2-3 days per week at NCB, SCB, Shackleford and Middle Core / Harkers Island.</p>	<p>Day Enforcement Total Program: Monitor compliance up to 2-3 days per week at NCB, SCB, Shackleford and Middle Core / Harkers Island (same as alternative A).</p>	<p>Day Enforcement Total Program: Monitor compliance up to 3-5 days per week at NCB, SCB, Shackleford and Middle Core / Harkers Island</p>	<p>Day Enforcement Total Program: Monitor compliance up to 2-3 days per week at NCB, SCB, Shackleford and Middle Core / Harkers Island (same as alternative A).</p>

TABLE 2: ALTERNATIVES ELEMENTS SUMMARY—RECREATION AND OTHER SEASHORE MANAGEMENT

Activity	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
	Entrance Station/Education: Provide no NPS education, information, and/or interpretation contacts to visitors (ORV users) arriving at Long Point and Great Island.	Entrance Station/Education: 2 additional enforcement rangers (6 month seasonal) provide entrance station education and information function about 50% of the time, vehicles arrive—10 hours per day, 4 days per week at the Long Point and Great Island ferry landings.	Entrance Station/Education: 4 additional enforcement rangers (6 month seasonal) provide entrance station education and information function 100% of the time vehicles arrive—10 hours per day, 7 days per week at the Long Point and Great Island ferry landings.	Entrance Station/Education: 4 additional interpretation rangers (6 month seasonal) provide entrance station education and information function 100% of the time vehicles arrive—10 hours per day, 7 days per week at the Long Point and Great Island ferry landings (same as alternative C).
	Night Enforcement: No regularly scheduled night enforcement.	Night Enforcement: Limited to 4 nights per month at NCB, SCB, Shackleford Banks, and Harkers Island / Middle Core Banks / “Ophelia Banks.”	Night Enforcement: Limited to 4 nights per month at NCB, SCB, Shackleford Banks, and Harkers Island / Middle Core Banks / “Ophelia Banks.”	Night Enforcement: No regularly scheduled night enforcement (same as alternative A).
Outreach	Provide informational brochures in the visitor centers on the seashore's endangered species. Educate visitors through posted signs, site bulletins, and interpretive programs. Send press releases notifying public of non-routine closures that affect ORV driving. Maintain park website with up-to-date closures informational.	Provide informational brochures in the visitor centers on the seashore's endangered species (same as alternative A). Educate visitors through posted signs, site bulletins, and interpretive programs (same as alternative A). Send press releases notifying public of non-routine closures that affect ORV driving (same as alternative A). Maintain park website with up-to-date closures informational (same as alternative A). Apr 01-Nov 31, 4 days per week, 10 hours per day station 1 person at each ferry landing to relay educational information about species and closures. Work with North Carolina Maritime Museum and Cape Lookout Environmental Education Center to educate visitors about sea turtles. Increase education regarding pet leash regulations.	Provide informational brochures in the visitor centers on the seashore's endangered species (same as alternative A). Educate visitors through posted signs, site bulletins, and interpretive programs (same as alternative A). Send press releases notifying public of non-routine closures that affect ORV driving (same as alternative A). Maintain park website with up-to-date closures informational (same as alternative A). Apr 01-Nov 31, 7 days per week, 10 hours per day station 1 person at each ferry landing to relay educational information about species and closures. Improve closure signs making them bigger for vehicle passengers. Review content of signs. Develop SBA signage. Provide daily morning report posting vehicle closure information on a map on the park website and at ferry landings. Increase education regarding pet leash regulations (same as alternative B).	Provide informational brochures in the visitor centers on the seashore's endangered species (same as alternative A). Educate visitors through posted signs, site bulletins, and interpretive programs (same as alternative A). Send press releases notifying public of non-routine closures that affect ORV driving (same as alternative A). Maintain park website with up-to-date closures informational (same as alternative A). Apr 01-Nov 31, 7 days per week, 10 hours per day station 1 person at each ferry landing to relay educational information about species and closures (same as alternative C). Increase education regarding pet leash regulations (same as alternative B).

TABLE 3: ANALYSIS OF HOW ALTERNATIVES MEET THE OBJECTIVES

Objectives in Taking Action	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Management Methodology				
Formalize adaptive interim management practices and procedures that have the ability to respond to changes in the seashore's dynamic physical and biological environment.	Meets objective to a moderate degree. Current resource management practices are in place and meet USFWS Recovery Plan Guidelines. Current management practices are consistent, but not officially formalized.	Meets objective to a moderate degree. Protected species management measures would be provided for protection in relation to the seashore's dynamic habitat. These guidelines would be formalized.	Meets objective to a large degree. Protected species management measures would be provided for protection in relation to the seashore's dynamic habitat. These guidelines would be formalized and afford the greatest degree of protection between the alternatives.	Meets objective to a moderate degree. Protected species management measures would be provided for protection in relation to the seashore's dynamic habitat. These guidelines would be formalized.
Provide procedures for prompt and efficient public notification of protected species management actions including the reasons for these actions.	Meets objective to some degree. Public notification procedures are in place through posted signs, site bulletins, interpretive programs, press releases notifying public of non-routine closures that affect ORV driving, and website postings of closures.	Meets objective to a moderate degree. Existing public notification methods would be supplemented with part-time coverage of the ferry landings to provide education to visitors entering the park.	Meets objective to a large degree. Existing public notification methods would be supplemented with full-time coverage of the ferry landings to provide education to visitors entering the park.	Meets objective to a large degree. Existing public notification methods would be supplemented with full-time coverage of the ferry landings to provide education to visitors entering the park.

TABLE 3: ANALYSIS OF HOW ALTERNATIVES MEET THE OBJECTIVES

Objectives in Taking Action	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Continue an ongoing and meaningful dialogue with multiple public groups interested in and affected by protected species management to ensure development of a workable plan.	Meets objectives to some degree. Although community outreach has occurred, the level is not adequate to ensure development of a workable plan.	Meets objective to a moderate degree. Communication and outreach with the community would be increased and additional opportunities for dialogue would exist.	Meets objective to a large degree. Communication and outreach with the community would be increased and additional opportunities for dialogue would exist more than Alt. A.	Meets objective to a large degree. Communication and outreach with the community would be increased and additional opportunities for dialogue would exist more than Alt. A.
Visitor Use and Experience				
Provide for continued recreational use and access consistent with required management of protected species.	Meets objective to some degree. Current funding would not allow for full recreation and/or protected species management due to staff and funding constraints.	Meets objective to some degree. Expected funding for this alternative would not allow for full recreation and/or protected species management due to staff and funding constraints. Some areas currently open for recreation would be closed for resource protection.	Meets objective to some degree. Expected funding for this alternative would not allow for full recreation and/or protected species management due to staff and funding constraints. Some areas currently open for recreation would be closed for resource protection.	Meets objective to a moderate degree. Needed funding for additional staff would likely be available, allowing for recreation and protected species management. Areas closed to recreation for resource management would not vary greatly from the current condition.

TABLE 3: ANALYSIS OF HOW ALTERNATIVES MEET THE OBJECTIVES

Objectives in Taking Action	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Increase opportunities for public awareness and understanding of NPS resource management and visitor use policies and responsibilities as they pertain to the seashore and protected species management.	Meets objective to some degree. Opportunities to increase public awareness and understanding about protected species management are limited, but do occur.	Meets objective to a moderate degree. As proposed, alternative B would allow for more staff and increased opportunities for education and increasing public awareness, but more outreach could be needed.	Meets objective to a large degree. As proposed, alternative C would allow for more staff and increased opportunities for education and increasing public awareness.	Meets objective to a large degree. As proposed, alternative D would allow for more staff and increased opportunities for education and increasing public awareness.
Threatened, Endangered, and Other Protected Species				
Provide protection for threatened, endangered, and other protected species (e.g., state-listed species) and their habitats from adverse impacts related to recreational uses as required by laws and policies.	Meets objective to some degree. Protected species management would meet Recovery Plan guidelines. Surveying and management would continue for most federally listed species and colonial waterbirds, but would not be as intensive for species such as American oystercatcher and Wilson's plover.	Meets objective to a large degree. Protected species management would meet Recovery Plan guidelines, additional surveying and management would occur for American oystercatcher, Wilson's plover, red knot.	Meets objective to a large degree. Protected species management would meet Recovery Plan guidelines and additional surveying and enforcement would occur for American oystercatcher, Wilson's plover, red knot.	Meets objective to some degree. Protected species management would meet Recovery Plan guidelines. Surveying and management would continue for most federally listed species and colonial waterbirds, but would not be as intensive for species such as American oystercatcher and Wilson's plover.

TABLE 3: ANALYSIS OF HOW ALTERNATIVES MEET THE OBJECTIVES

Objectives in Taking Action	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Actively consult and cooperate with the USFWS to ensure that NPS management actions comply with the requirements of the Endangered Species Act.	Fully meets objective. As mandated by NPS management policies and other regulations, the seashore will fully comply with the Endangered Species Act.	Fully meets objective. As mandated by NPS management policies and other regulations, the seashore will fully comply with the Endangered Species Act.	Fully meets objective. As mandated by NPS management policies and other regulations, the seashore will fully comply with the Endangered Species Act.	Fully meets objective. As mandated by NPS management policies and other regulations, the seashore will fully comply with the Endangered Species Act.
Seashore Management and Operations				
Develop an interim protected species management plan that minimizes impacts to other seashore operations.	Meets objective to some degree. Seashore operations are maintained and species management is occurring as appropriate for most federally listed species.	Meets objective to some degree. Seashore operations would be maintained with the hiring of additional staff and if adequate funding is available for the protected species management measures proposed.	Meets objective to some degree. Seashore operations would be maintained with the hiring of additional staff and if adequate funding is available for the protected species management measures proposed.	Fully meets objective. Seashore operations would be maintained with the hiring of additional staff and if adequate funding is available for the protected species management measures proposed.

TABLE 4: SUMMARY OF IMPACTS

Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative)
Federally Listed Special Status Wildlife and Plant Species				
Piping Plover	Continued seashore management under alternative A may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative A.	Alternative B may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, and surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative B.	Alternative C may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative C.	Alternative D may affect/is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect/are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative D.
Sea Turtles	While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore	Though surveying and management activities could greatly reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have both direct and indirect impacts on nesting sea turtles	Though additional full recreational closures, camping and light restrictions, and increasing compliance with closures and other regulations would reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have	While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore

TABLE 4: SUMMARY OF IMPACTS

Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
	under alternative A. Therefore, overall the actions taken under alternative A may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative A.	and hatchlings within the seashore under alternative B. Therefore the actions taken under alternative B may affect / are likely to adversely affect sea turtles. Past, current, and future activities both inside the seashore and within the state of North Carolina, when combined with the impacts of recreation use, surveying, and management of the species may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative B.	both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative C. Therefore actions taken under alternative C may affect / are likely to adversely affect all species of sea turtle. Past, current, and future activities both inside the seashore and within the state of North Carolina, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative C.	under alternative D. Therefore, overall the actions taken under alternative D may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative D.
Seabeach Amaranth	Surveying and management activities still provide the risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative A. Therefore the overall impacts of actions taken under alternative A may affect / are likely to adversely affect the seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the	Though surveying and management activities would protect both the plant and its habitat, greatly reducing the recreational impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative B. Therefore the overall actions under alternative B may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities	ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative C. While surveying and management activities would reduce these impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative C may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the	ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative D. While surveying and management activities would reduce these impacts, though not as much as under alternatives B or C, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative D may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
	impacts of recreation use, surveying and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative A.	both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative B.	impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative C.	within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative D.
State Listed and Special Status Species				
American Oystercatcher	Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use under alternative A would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative A.	Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative B would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative B.	Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on American oystercatchers. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative C.	Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative D.
Colonial Waterbirds	Under alternative A, surveying	Species surveying and	Species surveying and	Species surveying and

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
	and recreational use would have long-term moderate adverse impacts on colonial waterbirds. Species management and other management would have long-term, minor impacts. Cumulative impacts would be long-term, minor to moderate, and adverse . Impairment to colonial waterbirds would not be expected to occur under alternative A.	management actions under alternative B would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds entail some risks and do not apply equally to all birds, recreational use under alternative B would likely lead to long-term minor to moderate adverse impacts. Cumulative impacts would be long-term, moderate to major adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative B.	management actions under alternative C would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative C.	management actions under alternative D would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely result in long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative D.
Wilson's Plover	Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment on Wilson's plovers at Cape Lookout National Seashore would not occur under alternative A.	Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative B.	Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on the Wilson's plovers. Because protection measures for nesting Wilson's plovers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use is likely to lead to long-term major adverse impacts . Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to Wilson's plover at Cape Lookout National	Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse . Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative D.

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
			Seashore would not occur under alternative C.	
Red Knot	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be limited . Since red knots rest and feed only during the fall and winter when recreation use is low, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative A.	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative B.	The red knot is a winter, fall, spring, and occasional summer visitor at the seashore, and impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knot would not occur under alternative C.	The red knot is a winter, fall, spring and occasional summer visitor at the seashore, and impacts would be very limited . Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse . Cumulative impacts would also be long-term, minor and adverse . Impairment to red knots would not occur under alternative D.
Other Wildlife and Wildlife Habitats				
Invertebrates	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative A. Continuing to prohibit ORV traffic from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Though driving in the intertidal zone outside of these areas would have negligible impacts, doing so would require driving across wrack	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative B, but it would be less than alternative A. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would be negligible throughout the seashore.	Under alternative C the management measures for the protected species would enhance the protection of invertebrates more than alternative A, but slightly less than alternative B. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would continue to be	ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative D and would be less than alternative A, but more than alternatives B and C. Impacts within the intertidal zone would continue to be negligible throughout the seashore. Seasonally closing Middle Core Banks, "Ophelia Banks," and the northern 2 miles of South Core Banks would provide short-term minor to moderate benefits . By not restricting night driving, impacts on ghost crabs would be similar to alternative A,

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
	<p>lines. In areas where there is continual disruption of the wrack line there would be long-term moderate adverse impacts on the invertebrate population inhabiting this area, though the extent to which the wrack would be disturbed throughout the entire seashore is indeterminate at this time. To the extent that ORVs drive on softer intertidal sand flats, there would be long-term moderate impacts on soft-bodied animals, for even relatively few vehicle passes can decimate the animals. Though current levels of nighttime driving are not known, given the limited amount of night use in the past, the availability of the backroad network system, and the limited accessibility of the seashore to vehicles, allowing night driving would cause long-term negligible adverse impacts on the ghost crab population. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would continue to result in long-term negligible to moderate adverse impacts on invertebrates in the seashore depending upon the species. Though some of the ORV</p>	<p>Closing key piping plover migratory/wintering habitat would provide long-term moderate benefits by protecting all invertebrate species in these areas and allowing them to recover to natural levels. Closing Middle Core Banks and “Ophelia Banks” and the northern 2 miles of South Core Banks to ORVs would provide short-term minor to moderate benefits. Ghost crabs inhabiting the beach between Ramp 41B and Ramp 44 would be completely protected by prohibiting night driving, and encouraging drivers to use the backroads at night would result in impacts that were long-term minor to moderate beneficial (depending upon the current level of impact). The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on</p>	<p>negligible throughout the seashore. Closing key piping plover migratory/wintering habitat as well as the northern 2 miles of South Core Banks to ORV traffic year round would provide long-term moderate benefits. Closing Middle Core Banks and “Ophelia Banks” would provide short-term minor to moderate benefits. By not restricting night driving, impacts on ghost crabs would be similar to alternative A, though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative C.</p>	<p>though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas would still be impacted by ORVs. The total amount of impact throughout the seashore would be less than alternative A, but more than alternatives B and C due to the number of year-round and seasonal ORV closures. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative D.</p>

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	impacts on invertebrates would be long-term moderate adverse , the impacts would not be at a level that would threaten the existence of the invertebrate populations within the entire seashore. Invertebrate populations at the seashore would not be impaired under alternative A.	invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative B.		
Other Bird Species	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor and adverse . Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor and adverse . Impairment to other bird species would not occur under alternative A.	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse . Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse . Impairment to other bird species would not occur under alternative B.	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse . Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse . Impairment to other bird species would not occur under alternative C.	The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse . Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse . Impairment to other bird species would not occur under alternative D.
Visitor Use	Alternative A would provide continued ORV access throughout the seashore, except within full recreational or ORV closure areas implemented for bird or turtle protection. When chicks or hatchlings become mobile, continued ORV access around expanded closures via a backroad or	The closure of the northern 2 miles of South Core Banks and the closure of Middle Core Banks and "Ophelia Banks" would result in limited options for fishing or ORV use near inlets in comparison to alternative A. Potential ramp-to-ramp ORV closures to protect foraging American oystercatcher chicks	Similar to alternative B, permanent and seasonal species-related ORV closures would result in fewer options for fishing or ORV use near inlets. Potential ramp-to-ramp full-beach closures to protect mating American oystercatchers and expanded colonial waterbird buffers could result in further restrictions on ORV and other	Permanent and seasonal species-related closures would result in fewer options for fishing or ORV use near inlets. Additional closures encompassing all of Cape Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and the historical nesting areas of terns

TABLE 4: SUMMARY OF IMPACTS

Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
	<p>through closures via a limited escort program would result in short-term, minor, adverse impacts on ORV users.</p> <p>If closures that prevented ORV access through an area occurred at Cape Point, other inlets, or at multiple locations on South Core Banks and North Core Banks displacing ORV use for approximately one summer month, substantially less than 10% of annual ORV vehicle use days would be affected resulting in short-term minor to moderate adverse impacts on ORV users.</p> <p>ORV closures could result in some additional crowding and full recreational closures would restrict some pedestrian access resulting in short-term, minor, adverse impacts.</p> <p>Outreach efforts related to endangered species management and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.</p> <p>Long-term, minor, adverse cumulative impacts would occur.</p>	<p>would result in further restrictions on ORV use because oystercatchers nest throughout the seashore. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users, summer fishermen, and other recreational uses.</p> <p>However, if Cape Point was closed due to foraging chicks or hatching sea turtles, short-term, major adverse impacts could occur to anglers because many popular fishing areas would potentially be closed to ORV use. Because ORV access would continue to be maintained, impacts related to ORV closures around sea turtle nests and seabeach amaranth would be short-term and minor adverse.</p> <p>Camping prohibitions within 600 feet of sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry campers, particularly in June and October, due to the number of nests that occur along South Core Banks and North Core Banks.</p> <p>Full recreational closures</p>	<p>recreational uses. These combined restrictions could result in long-term, moderate to major, adverse impacts on ORV users and summer fishermen similar to alternative B because of reduced seashore-wide beach access.</p> <p>In the event that Cape Point was closed due to foraging chicks, impacts could be major adverse to summer anglers because many popular fishing areas would potentially be closed to ORV use.</p> <p>ORV and pedestrian impacts from sea turtle and seabeach amaranth buffers would be short-term and minor adverse. Camping prohibitions near sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry campers.</p> <p>However, pets would be allowed within in the seashore, but not within full recreational closure areas, resulting in long-term, minor, adverse impacts on those visitors who travel with their pets.</p> <p>Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in</p>	<p>and skimmers could further restrict ORV and other uses. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users and other recreational users, similar to alternatives B and C, because of reduced seashore-wide beach access.</p> <p>Similar to alternative A, ORV impacts from sea turtle and seabeach amaranth closures would be short-term and minor adverse. Camping would be prohibited in all turtle nesting areas, resulting in impacts similar to alternative A.</p> <p>Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in long-term, minor, beneficial effects because compliance surveying would be similar to alternative A (less frequent than under alternative C).</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>

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Impact Topics	Alternative A: No-Action, Continuation of Current Management	Alternative B: Increased Buffer Zones and Increased Surveying	Alternative C: Adaptive Species Management; Increased Surveying, Enforcement, and Education	Alternative D: Increased Species Protection Areas, Education, and Outreach (Preferred Alternative))
		<p>would result in short-term, minor, adverse impacts on pedestrians because they would continue to have access around most recreational closures.</p> <p>However, prohibition of pets within the seashore would result in long-term, moderate, adverse impacts on those visitors who regularly bring their pets to the seashore during the summer.</p> <p>Outreach efforts and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>	<p>long-term, moderate, beneficial effects; increased enforcement of species management requirements could result in long-term minor to moderate beneficial impacts.</p> <p>Long-term, moderate, adverse cumulative impacts would occur.</p>	
Socioeconomic Resources	<p>Implementation of alternative A would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, or some tourist-related businesses located in Carteret County, for overall visitor use at the seashore has increased nearly every year for the past 10 years while management practices have remained consistent. The duration of impacts, if any, would likely be short-term and occur on a yearly basis. Regional impacts</p>	<p>Implementation of alternative B would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative were implemented. However, some anglers, pet</p>	<p>Implementation of alternative C would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with this alternative's increased outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative were implemented. However, some anglers and</p>	<p>This alternative incorporates species management measures from all of the other alternatives and provides ORV and pedestrian access. However, additional closures would encompass all of Cape Lookout Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and historical nesting areas of terns and skimmers. These combined restrictions would result in the most reduced seashore-wide beach access</p>

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	would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse .	owners, and campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of impacts, if any, would likely be long-term . Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse .	campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of any impacts would likely be long-term . Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts under alternative C would be long-term minor and adverse .	of all the alternatives, and ORV users and anglers would be most impacted due to the limited access to spits and potentially long expanses of oceanfront.
Seashore Management and Operations	Staffing levels and resources in all three divisions dedicated to protected species management activities would remain relatively constant. Existing staff would not always be able to meet protected species management needs resulting in long-term moderate adverse impacts on all divisions. Temporary actions such as implementation of an escort program and/or storm recovery operations would result in long-term, moderate, adverse impacts on all divisions. The implementation of protected species management programs for all	Staffing levels and resources would increase for all three divisions. The total additional funding required under alternative B would be \$554,800 for the first year and \$351,800 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term moderate adverse impacts on the interpretation division and short- and long-term major adverse impacts on resource management and	Staffing levels and resources would increase for all three divisions. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The	Staffing levels and resources in the interpretation and resource management divisions would increase, while law enforcement staff would not increase. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would still be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The

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	three divisions would cost approximately \$478,313 under alternative A. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate impacts. The cumulative impacts under alternative A would be short-term moderate and long-term moderate adverse .	law enforcement. Temporary events such as the escort program and storms may result in long-term moderate to major adverse impacts on all divisions. Cumulative impacts would be short-term moderate to major adverse and long-term moderate adverse .	implementation of protected species management programs for all three divisions would cost an additional \$851,600 for the first year and \$610,600 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term major adverse impacts on all divisions. Cumulative impacts would be short- and long-term moderate to major adverse .	implementation of protected species management programs for all three divisions would cost an additional \$147,500 under alternative D. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate to major impacts, depending on the frequency and duration of the events. Cumulative impacts would be short- and long-term moderate adverse .

Affected Environment

AFFECTED ENVIRONMENT

This chapter of the plan/EA describes existing environmental conditions in the areas potentially affected by the alternatives. This section will describe the following resource areas: federally listed and special status wildlife and plant species, state-listed and special status species, other wildlife and wildlife habitats, visitor use and experience, socioeconomics, and seashore management and operations. Potential impacts are discussed in the “Environmental Consequences” section following the same order. For analysis purposes, the affected environment represents the environment existing in 2004.

FEDERALLY LISTED SPECIAL STATUS WILDLIFE AND PLANT SPECIES

PIPING PLOVER

The piping plover (*Charadrius melodus*) is a small (6 to 7 inches long, weighing 1.5 to 2.2 ounces), highly camouflaged, sand-colored shorebird endemic to North America (Haig and Elliot-Smith 2004). Two genetic races (Haig and Elliot-Smith 2004) and three geographic subpopulations are recognized: (1) the Atlantic Coast (from the Maritime Provinces of Canada to the Outer Banks of North Carolina); (2) the Great Lakes (along Lake Superior and Lake Michigan); and (3) the Great Plains (from southern, prairie Canada to Iowa). Wintering populations are found on the Atlantic Coast, from North Carolina to Florida; the Gulf Coast, from Florida to Mexico; and the Caribbean, with the greatest number of wintering birds found in Texas (Haig and Elliot-Smith 2004).

Fewer than 3,000 breeding pairs of piping plovers were detected in the U.S. and Canada in 2001 (Haig and Elliot-Smith 2004). The Atlantic Coast population was federally listed in 1986 as threatened (Federal Register 1985). At the time of listing, there were approximately 790 Atlantic Coast pairs, and the species was in decline. Therefore, a recovery target of 2,000 pairs was established in the Revised Recovery Plan for the Atlantic Coast population (USFWS 1996a).

Habitat loss, caused by human development and recreation, and low reproductive rates, caused by human disturbance and predation, were considered to be the primary causes of the decline (Haig 1992; Haig and Elliot-Smith 2004). Disturbance and predation were intensively managed after the listing, and the population rose to 1,676 pairs by 2003 (USFWS 2004b), but was still short of the recovery goal of 2,000 pairs (USFWS 1996a).

The population south of New Jersey is less densely populated than the north and was estimated at 203 pairs in 2003, well short of the regional goal for the southern Atlantic Coast of 400 pairs. North Carolina experienced a greater than 50% decline in breeding pairs from a peak of 55 pairs in 1989 and 1990 to a low of 20 pairs in 2004 (see table 9; USFWS 2004a) for reasons discussed in the “Risk Factors” section below.

PIPING PLOVER IN NORTH CAROLINA

North Carolina is currently the only state on the Atlantic Coast that has piping plovers during all phases of the annual cycle (Cohen 2005b), the stages of which include the establishment and holding of territories, courtship and copulation, nest scraping and nest building, egg laying, incubation, and chick rearing and fledging. The first published account of breeding piping plovers in North Carolina is from 1960, when a pair was found on Ocracoke Island within Cape Hatteras National Seashore (Golder 1985). North Carolina has supported from a high of 55 breeding pairs (in 1989 and 1990) to a low of 20 (2004) since annual surveying began in 1986 (table 9). Cape Lookout National Seashore (figure 4) is an

important nesting area because it has supported an average of 66% of all the nesting pairs in the state of North Carolina since surveying began.

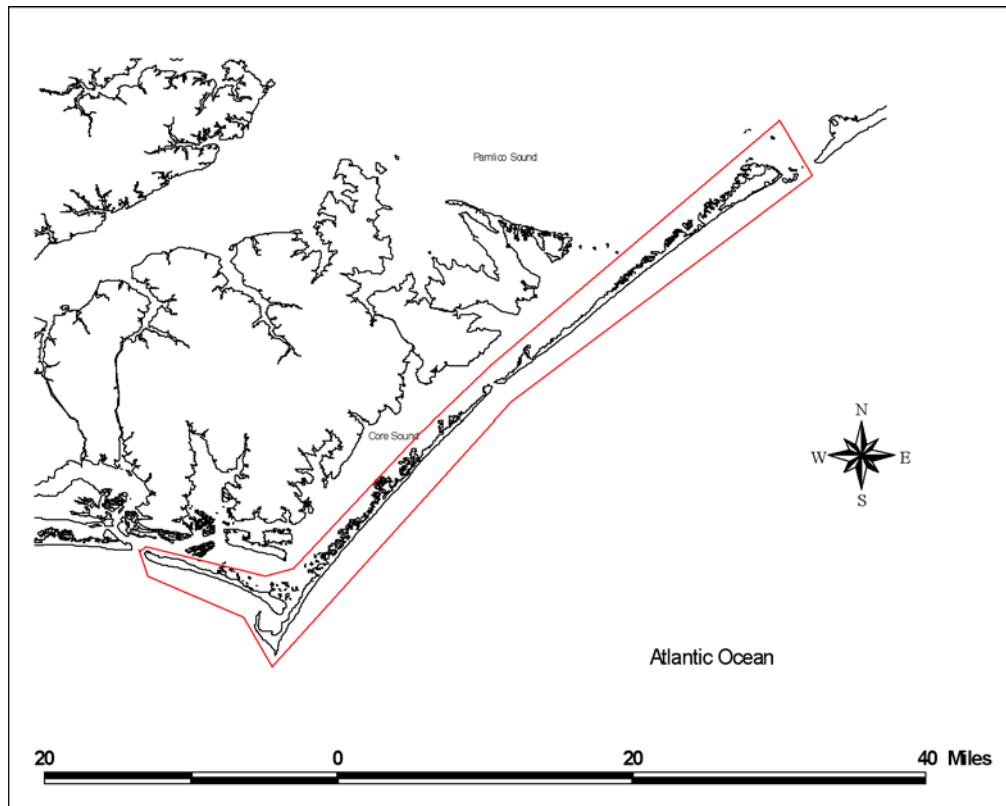
TABLE 9: SOUTHERN REGION (INCLUDING NORTH CAROLINA) PIPING PLOVER POPULATION TRENDS

	Delaware	Maryland	Virginia	North Carolina	South Carolina	Southern Region
1986	8	17	100	30 ^b	3	158
1987	7	23	100	30 ^b	-	160
1988	3	25	103	40 ^b	-	171
1989	3	20	121	55	-	199
1990	6	14	125	55	1	201
1991	5	17	131	40	1	194
1992	2	24	97	49	-	172
1993	2	19	106	53	1	181
1994	4	32	96	54	-	186
1995	5	44	118	50	-	217
1996	6	61	87	35	0	189
1997	4	60	88	52		204
1998	6	56	95	46		203
1999	4	58	89	31		182
2000	3	60	96	24	0	183
2001	6	60	119	23		208
2002	6	60	120	23		209
2003	6	59	114	24		203
2004 ^a	7	66	152	20		245
GOAL						400

Source: <http://www.fws.gov/northeast/pipingplover/index.html>

Source: ^a <http://www.fws.gov/northeast/pipingplover/status/preliminary.04.pdf>

^b The recovery team believes that the apparent 1986-1989 increase in the North Carolina population is because of an intensified survey effort.



Source: NPS

FIGURE 4: CAPE LOOKOUT NATIONAL SEASHORE (BOUNDED BY POLYGON)

Habitat Description

On the Atlantic Coast, piping plovers nest in sand, gravel, or cobble substrates in backshore, dune, interdune blowout, overwash fan, and barrier flat zones of open or sparsely vegetated beaches (Haig 1992). Nest sites may have little or no slope (Cairns 1982; Burger 1987), although nesting does occur on lower-elevation dunes (Cairns 1982). On wide beaches, piping plovers nest in the open to maintain a wide field of view, but on narrower beaches, eggs can be laid in clumps of vegetation (Cairns 1982). Where beaches are wide, piping plovers tend to nest far from the tide line to reduce risk of nest overwash, but this places nests closer to vegetated dunes, where risk of predation is high (Burger 1987).

Piping plover nesting sites at Cape Lookout National Seashore include inlets, former inlet sites, sand flats, and overwash fans. Predators, flooding in storms, and disturbance by people and dogs, threaten nesting success in these habitats. Critical habitat has been designated for the areas near the inlets at Cape Lookout National Seashore. The areas included in the critical habitat designation include all the inlets in the seashore, Portsmouth Flats, Kathryn Jane Flats, and Cape Point. The habitat includes ocean beach, mudflats, sandflats, and soundside beach used as foraging areas and sparsely vegetated low dunes used by roosting piping plovers (table 10).

Diet

Piping plovers feed primarily on terrestrial arthropods and benthic worms (Haig 1992). Adults forage both day and night (Staine and Burger 1994), but young chicks are brooded during the night and feed by

day (Wolcott and Wolcott 1999). During territory establishment, foraging adults exhibit a preference for a moist, substrate habitat (MOSH) that particularly includes mud flats, sand flats, ephemeral pools, and shores of brackish ponds, and excludes the high-wave energy intertidal zone (Cohen 2005b). Broods forage primarily on damp sand flats or MOSH (Coutu et al. 1990), where their percent time spent foraging and prey abundance were much higher than in other habitats (Kuklinski et al. 1996).

Broods spend more time foraging in the wrack, sparse vegetation, wet-sand flat, and overwash areas than expected, based on the percent availability of those habitats (Kuklinski et al. 1996). Chicks with access to MOSH survived better than chicks without such access in Virginia (Loefering and Fraser 1995), Rhode Island (Goldin and Regosin 1998), and, in some years, in New York (Elias et al. 2000). Burger (1994) found that having access to a diversity of foraging habitat zones available to broods reduced the impact of human disturbance, because it provided opportunities for chicks to escape disturbances and still forage.

BREEDING BIOLOGY

Piping plover eggs, chicks, and incubating adults are highly camouflaged (Haig 1992; Haig and Elliot-Smith 2004). On the Atlantic Coast, breeding-territory establishment and courtship generally begin in late-March, the first nests are initiated in late-April, and the brood-rearing period extends from late-May to mid-August (Cohen 2005b). In more densely populated beaches in the northern end of the Atlantic Coast breeding range, most pairs establish within a day or two of the birds' arrival in early spring, whereas pairs on sites in the mid-Atlantic, with fewer birds, can take several days or weeks to become established (Haig and Elliot-Smith 2004).

Piping plovers are monogamous, though retention of the same mate between breeding seasons is variable. The nest is built by the male and consists of a shallow scrape in sandy substrate that may or may not be lined with pebbles and shell fragments. Four is the normal clutch size, and one egg is laid every other day until the clutch is complete. Replacement eggs are not reported. If one or more eggs are lost, the pair continues to incubate the remaining eggs (Haig and Elliot-Smith 2004). Incubation is shared by males and females, and typically begins the day of clutch completion, but sometimes, instead, when the next-to-last egg is laid.

The length of incubation ranges from 25 to 29 days, and a pair will re-nest multiple times if successive clutches are destroyed, but re-nesting after the chicks hatch is rare (Haig and Elliot-Smith 2004). Chicks leave the nest scrape within a few hours of hatching, and never return except when a nest hatches at night (Wolcott and Wolcott 1999). Members of a breeding pair share brood-rearing duties, though some females desert broods within 5 to 17 days (Haig and Elliot-Smith 2004). Although chicks follow adults to a foraging habitat, they forage for themselves. Fledging time ranges from 21 to 35 days (Boettcher 2006). Adults and young depart the breeding grounds from mid-July to early-September.

Reproductive Performance at Cape Lookout National Seashore

Cape Lookout National Seashore is used by locally nesting as well as migrating and wintering piping plovers (from the threatened Atlantic Coast and Great Plains populations and the endangered Great Lakes population). The first records of nesting piping plovers at the seashore are from the 1983 and 1986 nesting seasons when 14 and 25 pairs respectively nested on North Core Banks (Fussell 1986). The nesting population at the seashore reached a peak of 39 pairs in 1994 and declined for 10 years to a low of only 13 pairs in 2004 (NPS 2006) (table 10). Over the 14 years of continuous surveying (1986-2005) Cape Lookout National Seashore has supported an average of 26.21 pairs of piping plovers (table 10). However, reproduction performance has averaged 0.40 young per nesting pair, which is well below the 1.5 targeted set in the revised recovery plan (table 11). Possible explanations for this low reproductive performance are failure of nests from the loss of egg and chicks from some combination of the following: recreation disturbance, bird and/or mammal predation, or ecosystem effects consistent with the fact that Cape Lookout is located at the very southern limit of the range of the piping plover. Ecosystem effects

could include such things as insufficient prey item density, climatic stress, or competition from other organisms for food, nest sites, or key habitat elements.

TABLE 10: NUMBERS OF PIPING PLOVER BREEDING PAIRS AT TEN SITES WITHIN CAPE LOOKOUT NATIONAL SEASHORE 1989-2005

	1989	1992	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005
Ocracoke Inlet	0	2	0	2	2	1	0	1	0	0	0	0	0	0
Portsmouth Flats	14	8	9	7	8	17	15	9	11	9	8	6	4	6
Kathryn-Jane Flats	7	11	9	12	11	10	8	2	1	1	2	1	1	2
Old Drum Inlet	3	2	1	1	2	1	1	0	0	0	0	1	0	0
New Drum Inlet (North Core Banks)	4	5	9	10	6	3	2	3	1	2	2	2	2	3
New Drum Inlet (South Core Banks)	3	3	4	5	4	2	3	3	2	3	2	2	2	2
Plover Inlet (Mile 23.6)	0	0	0	0	0	1	1	1	1	1	1	1	4	8
Cape Point	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Power Squadron Spit	3	2	3	2	2	1	2	1	0	0	0	1	0	1
Shackleford Banks	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cape Lookout National Seashore Total	34	33	35	39	35	36	32	21	16	16	15	14	13	27

TABLE 11: NUMBER OF PIPING PLOVER NESTING PAIRS AND REPRODUCTIVE PERFORMANCE, CAPE LOOKOUT NATIONAL SEASHORE, 1989 – 2005

Year	Nesting Pairs	Number of Nests	Chicks Fledged	Fledge Rate
1989	34	56	25	0.74
1992	33	39*	7*	0.25*
1993	35	56	26	0.74
1994	39	66	9	0.23
1995	35	43	15	0.43
1997	36	41	7	0.19
1998	32	39	11	0.34
1999	21	22	2	0.09
2000	16	18	8	0.50
2001	16	19	5	0.33
2002	15	20	4	0.27
2003	14	15	6	0.43
2004	13	13	12	0.92
2005	27	31	23	0.85

*North Core Banks only

Risk Factors

Small populations face a heightened risk of extinction compared to large populations, because they are more vulnerable to the following: (1) random environmental variations, such as storms; (2) reduction in genetic variations that limit a species' ability to adapt to local conditions; (3) sudden, random drops in birth and death rates; and (4) an impaired ability at finding suitable mates (Lande 1988). Threats to nesting success in Cape Lookout National Seashore include human disturbance, predators, and flooding. Given the vulnerability of the small piping plover population at Cape Lookout National Seashore to extirpation because of random events, the persistence of the population will depend increasingly on controlling all sources of mortality to adults, eggs, and chicks. Predators, human disturbance, and access to foraging habitat, have been identified in past research as contributing to impaired reproductive success at Cape Lookout National Seashore (NPS 2006). There may be evidence that piping plovers are finding it increasingly difficult to attract mates (known as the "Allee effect"), since surveying reports from 2001 to 2003 and 2005 indicate that unpaired birds displaying territorial behavior were observed in the prelaying period at several sites (NPS 2006). Thus, providing a disturbance-free environment early in the season may help piping plovers establish territories and attract mates (Cohen 2005b).

Weathers and Tides. There have been 10 named hurricanes on the Outer Banks between 1993 and 2005 (Cordes 2005b). Hurricanes and other ocean storms can lead to unusually high tides, and subsequent flooding can overwash piping plover nests (Haig 1992). Indeed, some piping plovers that nest too closely to mean high tide may lose their nests on normal high tides (Cohen 2005b). Storms can also result in widespread mortality of chicks (Houghton et al. unpublished). Flooding during the nesting season has been a major threat to nesting success, particularly in 1992 and 1994, and some nests at Portsmouth Flats were elevated to protect them from flooding in 1998 and 1999 (NPS 2006). In addition to these direct effects of storms on piping plover nests, flooding because of extraordinarily high tides or storm surges may also alter habitat enough to render it unsuitable for nesting. This may lead to the abandonment of habitat within or between breeding seasons (Haig and Oring 1988).

Predation. Predation is a primary factor limiting reproductive success of the piping plover (Haig 1992). Predators in Cape Lookout National Seashore that take plover eggs or chicks include raccoons, feral cats, gulls, crows, grackles and ghost crabs. Predator exclosures have been used on some nests since 1993. Since 1997, 66% of the nests protected with exclosures have hatched. Only 24% of the nests left unprotected hatched. The use of exclosures improved a nest's chance of hatching, but did not increase the number of chicks that fledged (NPS 2006). Anecdotal evidence indicates that ghost crabs may be more of a problem in North Carolina than at sites further north (Allen 2006; Cohen 2005b). Predators in piping plover habitat can also lead to piping plovers' abandoning territories within and between breeding seasons (Cohen 2005b).

Human Activity. Human pedestrians and joggers occasionally destroy nests or kill chicks, either by intentional vandalism or by accident (Patterson et al. 1991; Houghton et al. unpublished). ORVs can run over adults, nests, and chicks, some of which may run or crouch in vehicle tracks in response to danger. Piping plover chicks are difficult to see in this situation because of their camouflaging (Melvin et al. 1994). Human development and recreation can result in loss and/or degradation of breeding habitats (Haig 1992). ORV use has been demonstrated to destroy the wrack line (Goldin 1993), thereby degrading an important foraging habitat. Breeding and nonbreeding piping plovers are subject to disturbance (disruption of normal activities) by ORVs, pedestrians, and unleashed pets. Human disturbance, including dogs, was found to be a problem in Cape Lookout National Seashore in 1989. Since then, through improved compliance of closed areas, human impact has been reduced (NPS 2006).

The impact of predation has been postulated to be greater on beaches with high human use, because the presence of pets and trash that may attract wild predators is correlated with the presence of humans (USFWS 1996a). In some studies, beaches with high levels of human disturbance had lower reproductive rates than less-disturbed beaches (Cairns 1982; Flemming et al. 1988). At other sites, disturbance did not

affect reproductive rate (Patterson et al. 1991; Hoopes 1993; Burger 1994), although pedestrians, kites, and ORVs caused a decrease in brood-foraging behavior in Massachusetts (Hoopes 1993) and New Jersey (Burger 1994). It is important to note, however, that in the high-disturbance sites in the above studies, disturbance was being actively managed to protect piping plovers.

In New York, the response of incubating adults to the presence of humans near the nest was found to be highly variable and average nest success was unrelated to the number of disturbance sources observed within 100 meters of nests (Houghton et al. unpublished). However, piping plovers may be more sensitive to disturbance in the Atlantic Coast southern recovery unit, as evidenced by longer flush distances in response to disturbance sources at Assateague National Seashore (Loefering 1992). In Texas, piping plovers avoided foraging on sandflats close to areas of high human use (Drake et al. 2001). Zonick (2000) found that the number of piping plovers was lower on disturbed bayside flats than undisturbed flats, and that piping plovers experienced lower foraging efficiency when disturbed. Other unpublished data support the assertion that winter habitat selection is negatively correlated with human activities and development.

ORV use may affect the beach through sand displacement and compaction, which may lead to steeper dune profiles (Anders and Leatherman 1987), which, in turn, may prove less suitable for piping plover nesting. Destruction of the wrackline by ORVs may negatively impact reproductive success because of loss of important habitat used for foraging and cover (Goldin 1993).

Beach and dune re-nourishment projects can alter the profile of beaches, causing increased erosion and habitat loss (Leatherman and Allen 1995). Finally, research, surveying, and even protective management activities can sometimes expose piping plovers to a risk of disturbance at breeding sites (Mabee and Estelle 2000). For example, adult birds may be more vulnerable to predation within exclosures (Murphy et al. 2003a) depending on the local predator pool and the type of exclosure used. Adults may also abandon exclosed nests more frequently (Hecht 2004).

NONBREEDING AND WINTERING PLOVERS AT CAPE LOOKOUT NATIONAL SEASHORE

North Carolina is currently the only state on the Atlantic Coast that has piping plovers during all phases of the annual cycle. Band sightings indicate that plovers from all three North American breeding populations use Cape Lookout National Seashore during fall and spring migration and/or the winter. All plover breeding sites at the seashore are within areas designated as critical habitat for wintering birds except for a site used on Shackleford Banks in 2005 (figure 5).

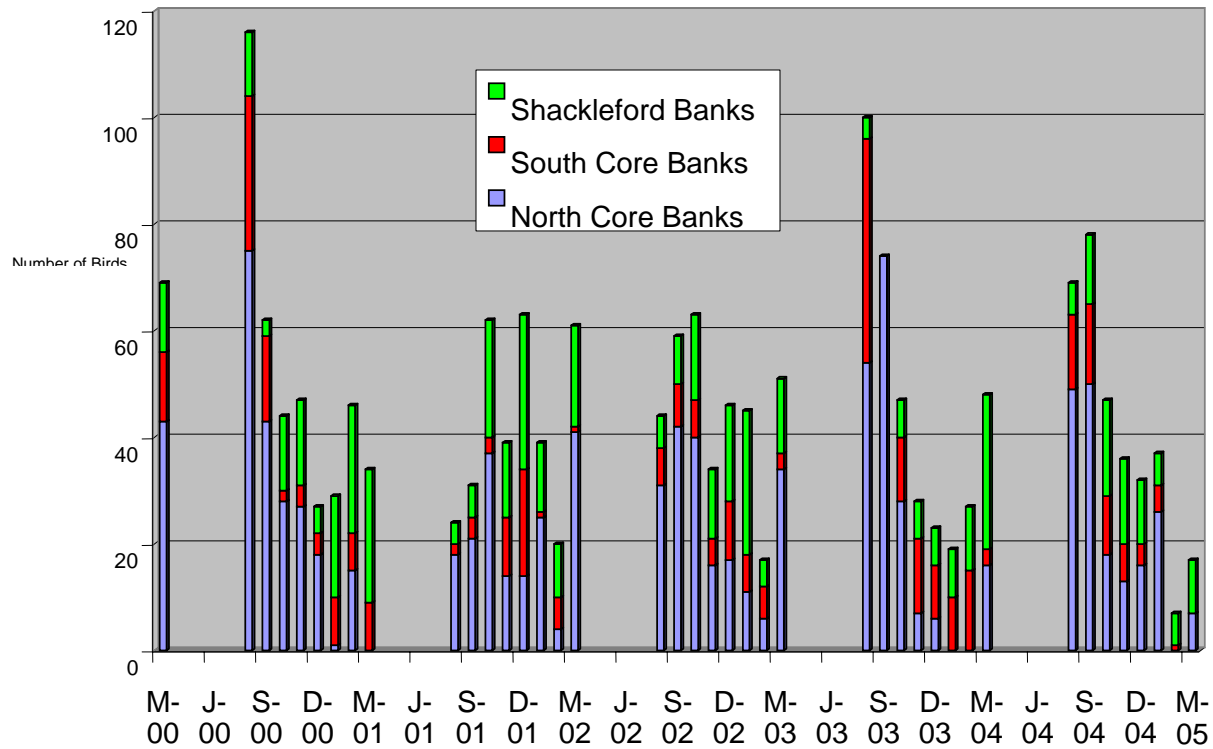
From 2000 to 2005, monthly counts of piping plovers were conducted from August to March. The greatest number of nonbreeding plovers at Cape Lookout National Seashore occurred during spring and fall migrations (figure 6). An average of 45 piping plovers were found in the park during the monthly counts. The area on North Core Banks from Ocracoke Inlet to Mile 4 had the highest number of birds, especially in spring and fall migrations. On average, more than 20 piping plovers were found in this area and double that during migrations (Cordes 2003).

The first banded winter residents have appeared in August, although wintering birds may arrive in July (figure 6). The non-breeding population occurring at Cape Lookout National Seashore from December to January likely consists entirely of winter residents. The size of the resident wintering population is variable because birds regularly move outside the seashore boundaries. Based on a sample of banded birds, winter residents can be present until April.

More than half of the birds counted were found on North Core Banks, most within 5 miles of Ocracoke Inlet, and 99% of the observations were made within eight key wintering areas (figure 7). Rare observations made outside these areas occurred during fall and spring migrations.



FIGURE 5: CRITICAL HABITAT DESIGNATED FOR WINTERING PIPING PLOVER



Note: M – March; J – June; S – September; D – December

FIGURE 6: MONTHLY COUNTS OF NON-NESTING PIPING PLOVER AT CAPE LOOKOUT NATIONAL SEASHORE

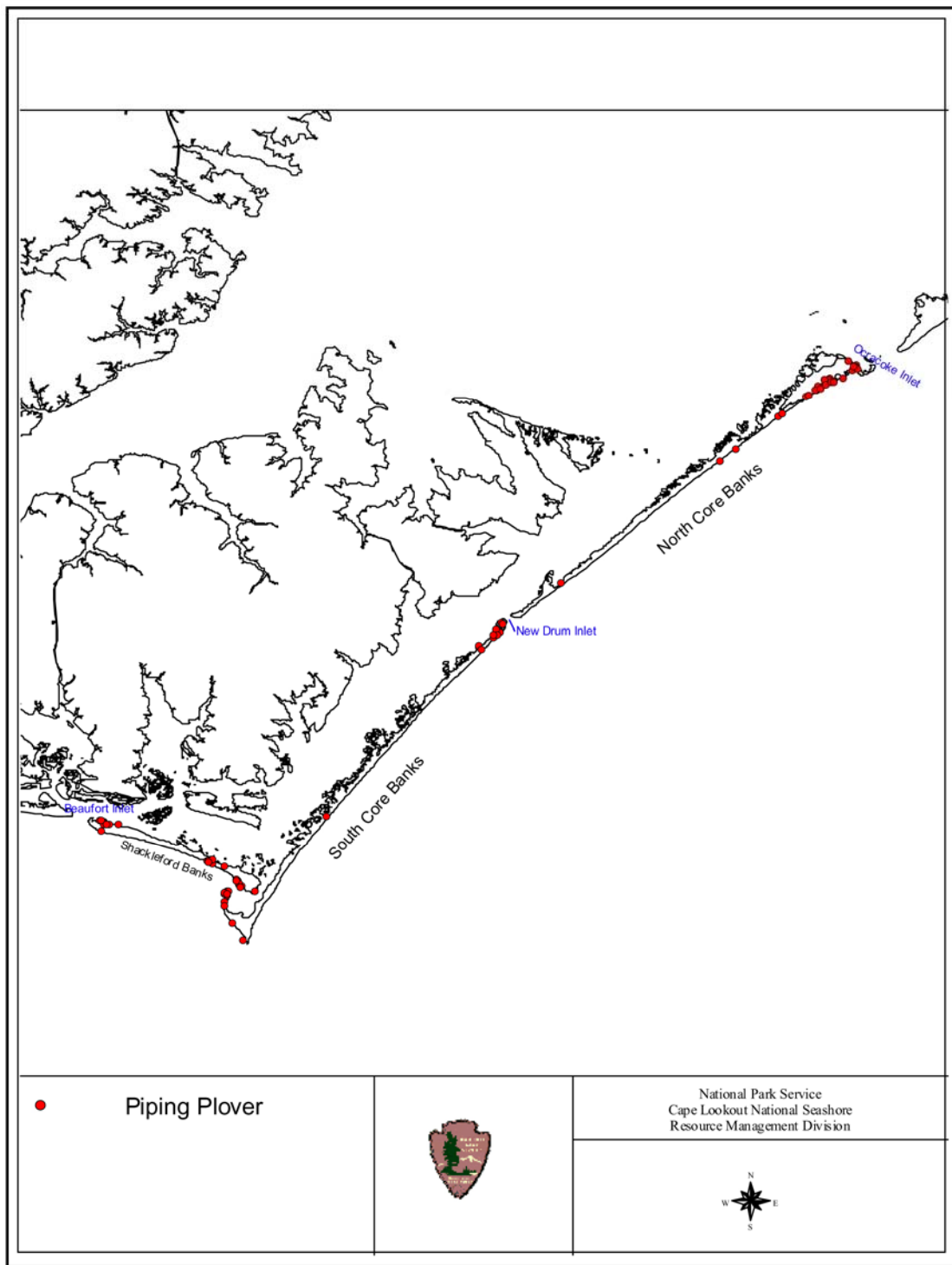


FIGURE 7: LOCATIONS OF PIPING PLOVER IN THE NON-NESTING SEASON (2000 – 2003)

The following key wintering locations were identified in surveys from 2000 to 2003:

Ocracoke Inlet—Piping plovers were in this area every month but February. Depending on tide and weather conditions, birds were found on intertidal beach or mudflats. They occasionally were found as far to the west as Wallace Channel dock, nearly one-half mile from the ocean beach.

Mile 0–Mile 4.0, Ocean Beach—Piping plovers were found in this area throughout the non-nesting season, with an average of 18 birds being present. During spring migration, an average of 40 birds were found using this area.

Portsmouth Flats—This area of intermittently flooded sand flats is the primary foraging area used by nesting piping plovers at Cape Lookout National Seashore. An average of seven birds were present in the months of August–December. No piping plovers were ever seen in this area in January, February or March, since insects are likely the primary food source in this area and would not be abundant in the coldest winter months.

New Drum Inlet (South Core Banks)—Mudflats on the soundside of New Drum Inlet were commonly used by piping plovers during the survey. Erosion has washed away much of the flats and the birds have shifted to the ocean beach and shoals in the area. Birds were present in every month but October, with the migration months of August and March having the highest numbers. An average of four birds were found at this location during the surveys. The shoals off Drum Inlet and the north side of the inlet were not covered as part of this survey. It is likely that additional piping plovers are using this area.

Power Squadron Spit (South Core Banks)—Both ocean and soundside beaches were used by foraging piping plovers. The area next to the primary duneline on the ocean beach was often used as a roosting spot. An average of 3 birds were counted in this area with the most birds present in September and December.

East End of Shackleford Banks—The ocean beach on the east end of Shackleford Banks provided a roosting spot at high tide and foraging habitat at low tide. The intertidal beach here is muddier than typical ocean beach because of lower wave energy. Power Squadron Spit shields this area from high wave action. From observations of banded birds it was confirmed that some piping plovers move between this area and Power Squadron Spit across Barden Inlet.

Corral Area of Shackleford Banks—The area of Shackleford Banks between Mile 49 and Mile 50 is used by piping plovers throughout the non-nesting season. Mudflats on the soundside are used for foraging and the ocean beach is used for roosting at high tide and foraging at low tide. An average of 3 birds were counted in this area with a consistent number of birds present.

West End of Shackleford Banks—The soundside beach on the West End of Shackleford Banks had an average of 6 piping plovers present. Plovers were present throughout the non-nesting season but more numerous in January through March. The piping plovers in this area spend part of their time foraging on the mudflats of the nearby Rachel Carson National Estuarine Research Reserve, one mile to the north.

SEA TURTLES

Sea turtles are large marine reptiles found in subtropical, tropical, and temperate oceans as well as subarctic areas. They spend the majority of their time in ocean waters, with females only coming ashore

to nest on sandy beaches. Five of the seven sea turtle species existing in the world today occur in the coastal waters of North Carolina and Cape Lookout National Seashore, and all are listed as either federally threatened or endangered. The species are the loggerhead sea turtle (*Caretta caretta*), the green sea turtle (*Chelonia mydas*), the Kemp's ridley sea turtle (*Lepidochelys kempii*), the leatherback sea turtle (*Dermochelys coriacea*), and the hawksbill sea turtle (*Eretmochelys imbricata*). All but the hawksbill and Kemp's ridley are known to regularly nest at the seashore, and the only occurrence of hawksbill at the seashore was a single dead stranding in 2003 and two dead strandings in 2005. At Cape Lookout National Seashore, Kemp's ridley turtles are mostly known from strandings; however, in 2003 a single nest was documented. This was the first Kemp's ridley nest ever recorded at the seashore and only the second ever recorded in North Carolina (Cordes and Rikard 2003). In 1978, the loggerhead turtle was federally listed as threatened (NMFS and USFWS 1991a). Also in 1978, the green turtle was federally listed as threatened, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered (NMFS and USFWS 1991b). The leatherback was listed as federally endangered in 1970 (NMFS and USFWS 1992a, 1992b). All three species carry the same state listings as well (NCWRC 2004).

Since 1990, the number of sea turtle nests at the seashore has averaged 131 (see figure 8). Of the four species known to have nested at the seashore, the loggerhead is by far the most numerous, comprising approximately 99% of the known nests between 1990 and 2005 (Cordes and Rikard 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005; Cordes 2005c). Green and leatherback sea turtles breed primarily in the tropics and are rare nesters at higher latitudes, only nesting sporadically at Cape Lookout National Seashore. Within the Seashore, South Core Banks receives the most nests annually, approximately 53%, with the greatest concentration occurring south of the lighthouse between mile markers 42 – 44 (see figure 9). North Core Banks receives approximately 34% of the nests, and Shackleford Banks, approximately 13% of the nests. Nests are generally evenly distributed throughout these two banks (Cordes and Rikard 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005).

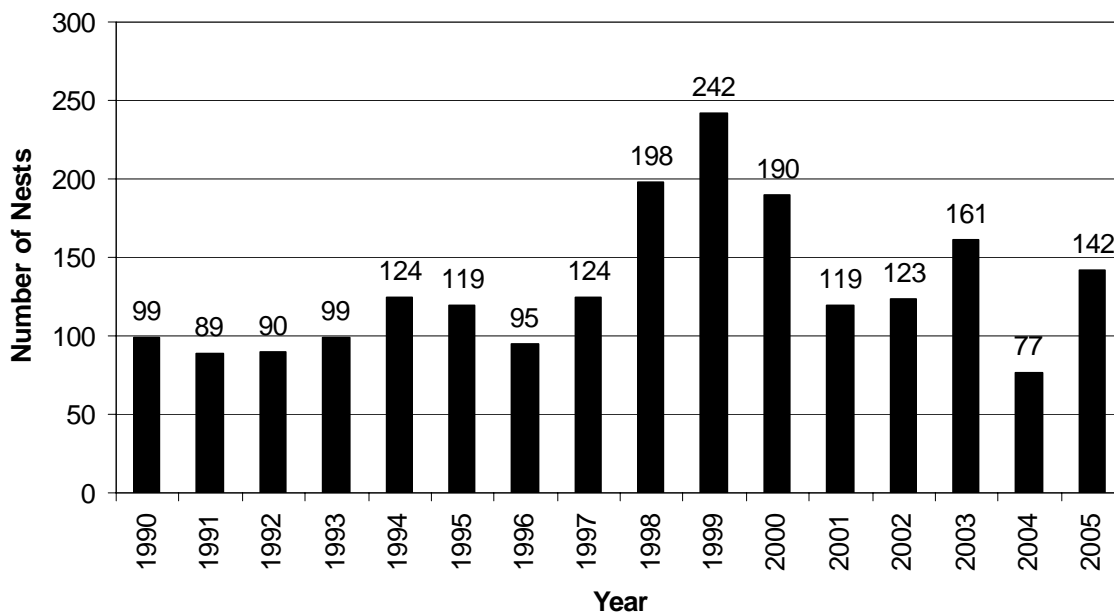


FIGURE 8: NUMBER OF SEA TURTLE NESTS AT CAPE LOOKOUT NATIONAL SEASHORE (FROM 1990 TO 2005)

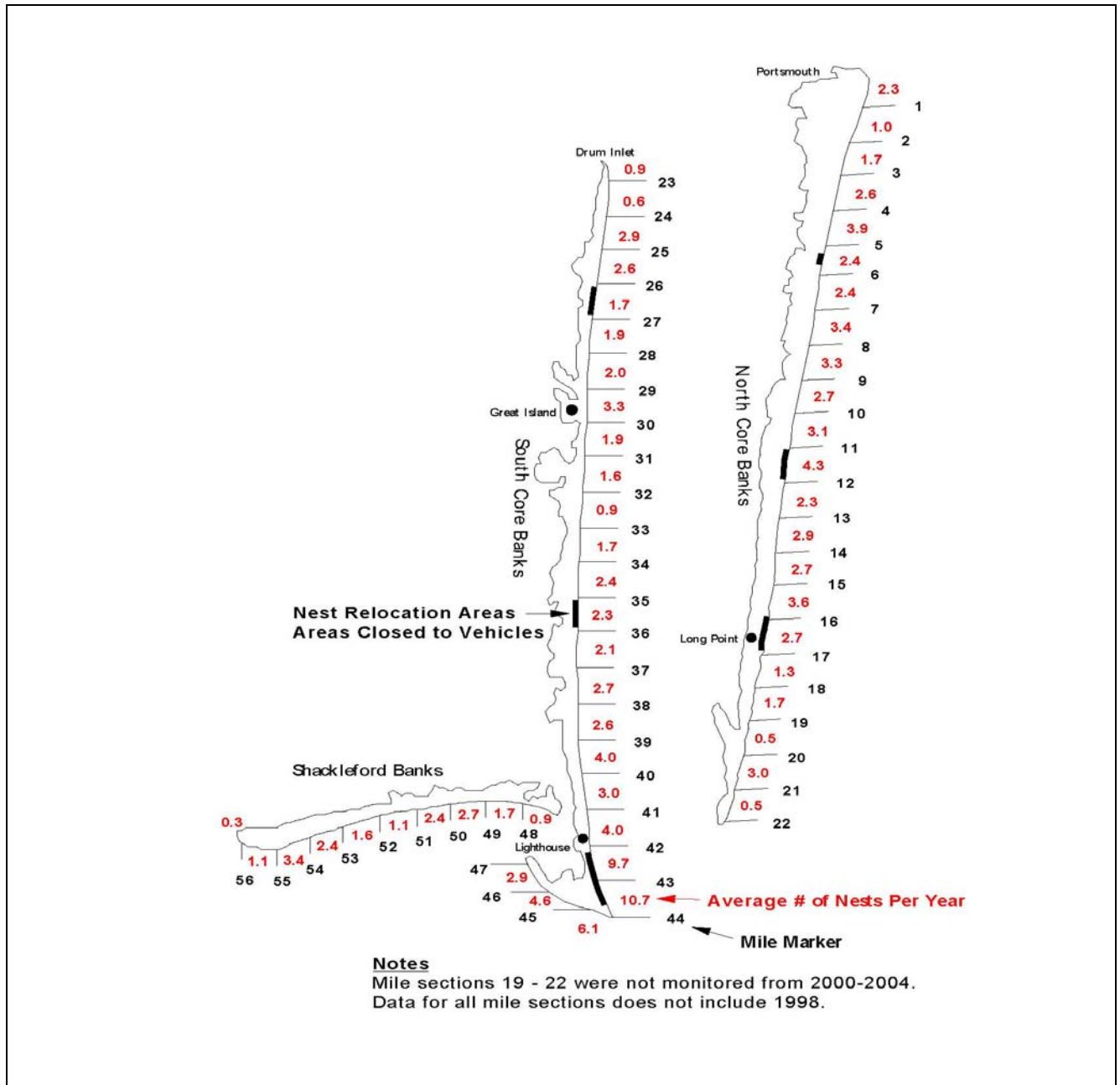


FIGURE 9: AVERAGE NUMBER OF SEA TURTLE NESTS BETWEEN MILE MARKERS

LOGGERHEAD TURTLE

The loggerhead sea turtle occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian oceans. Within the U.S., the loggerhead turtle nests from Texas to Virginia, with the major nesting concentrations found in south Florida. Since being listed, the population in the U.S. Atlantic increased from approximately 14,150 animals in 1983 (NMFS and USFWS 1991a) to between 32,000 and 56,000 animals in the year 2000 (Ehrhart et al. 2003). Within the northern subpopulation (North Florida to North Carolina), studies in South Carolina and Georgia have documented a decline in the number of nests (Ehrhart et al. 2003). However, since standardized surveying began in North Carolina in the mid-1990s,

the number of loggerhead nests per season has remained fairly stable, averaging 731 nests from 1995 to 2004 (see figure 10) (M. Godfrey, NCWRC, unpublished data). At Cape Lookout National Seashore, the average number of loggerhead nests between 1990 and 2005 was 129, with the lowest number of nests occurring in 2004; however, that was a poor year for the entire southeast Atlantic coast (Lyons 2005a). The highest number of nests was 242 occurring in 1999 (see figure 11) (Cordes 2005c). From 1990 to 2004 Cape Lookout National Seashore averaged approximately 20% of the loggerhead nests in North Carolina (M. Godfrey, NCWRC, unpublished data).

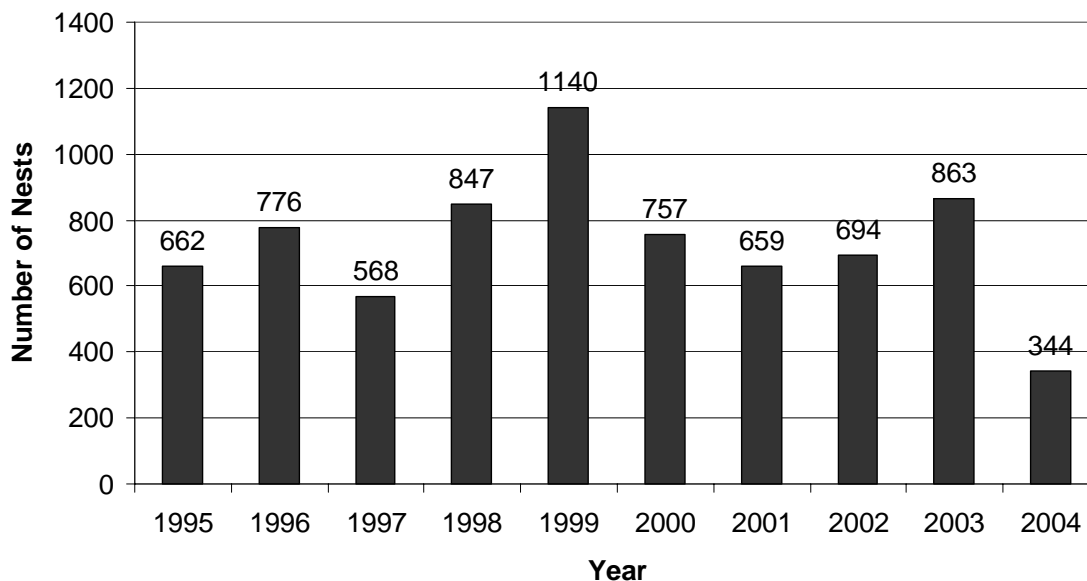


FIGURE 10: NUMBER OF LOGGERHEAD TURTLE NESTS IN NORTH CAROLINA (FROM 1995 TO 2004)

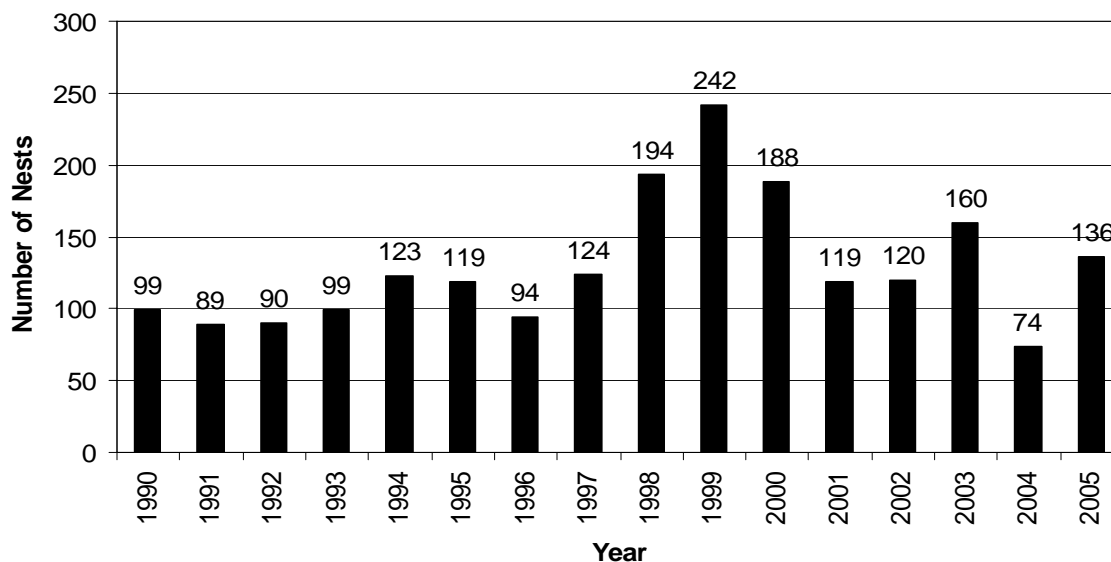


FIGURE 11: NUMBER OF LOGGERHEAD TURTLE NESTS AT CAPE LOOKOUT NATIONAL SEASHORE FROM 1990 TO 2005

Loggerhead turtles spend the majority of their life history at sea, with only mature females coming ashore to nest every 2 to 3 years, on average (Schroeder et al. 2003). The first turtle nests generally begin to appear at the seashore in mid-May, and the last nests are deposited in late-August. Typical nesting areas for loggerheads tend to be sandy, wide, open beaches, backed by low dunes (Miller et al. 2003). Some factors that have been found to determine nest selection include beach slope, temperature, distance to the ocean, sand type, and moisture, though results were occasionally contradictory (Miller et al. 2003). The beaches at Cape Lookout National Seashore are typical of the preferred nesting habitat for sea turtles, consisting of a moderate dune system, wide gently sloped beaches with little or no vegetation, beaches that are not re-nourished, and sand that is the appropriate size and texture for nesting habitat.

Although the process of nest-site selection is not well understood, a successful nest must be laid in a low salinity, high humidity, well-ventilated substrate that is not prone to flooding or burying because of tides and storms, and where temperatures are optimal for development (Miller et al. 2003). At the seashore, between 1990 and 2004, on average 56% of the nests found (all turtle species included) were relocated from their original location by seashore staff. Most nests that were relocated would have been lost to flooding had they not been moved. The emergence success rate of relocated versus non-relocated nests during that same period was very similar; averaging 66% success for relocated nests and 67% for non-relocated nests (Cordes and Rikard 2004).

Loggerheads are nocturnal nesters. Females emerge from the ocean and crawl toward the dune line until they encounter a suitable nest site. The female clears away surface debris with her front flippers, creating a “body pit,” and then excavates a flask-shaped nest cavity with her hind flippers. Loggerheads throughout the southeastern U.S. lay an average of 100 to 126 eggs per nest (NMFS and USFWS 1991a). After laying her eggs, the female covers the nest with sand, using all four flippers. Once the nest-covering phase is complete, she crawls back to the sea.

Individual females may nest one to seven times per nesting season, at an average interval of 14 days (NMFS and USFWS 1991a). The nest incubation period (from laying to hatching) depends on temperature, and ranges on average from 63 to 68 days in North Carolina (NMFS and USFWS 1991a). The sex ratio of hatchlings also depends on temperature during incubation. Below 84 °F, more males are produced than females, and above that temperature, more females are produced (Carthy et al. 2003). For this reason, the northern part of the U.S. Atlantic population, which includes North Carolina, apparently provides a disproportionate number of males to the larger population (Mrosovsky et al. 1984; Hansen et al. 1998).

Hatchling emergence occurs almost exclusively at night (Mrosovsky 1968; Witherington et al. 1990) and may occur over several nights. Upon emerging from the nest, hatchlings primarily use light cues to find and move towards the sea (Witherington and Martin 1996). Once in the water, they swim incessantly out to sea to offshore habitats where they will spend the next phase of their life history.

GREEN TURTLE

The green turtle is a circum-global species in tropical and subtropical waters. The major green turtle nesting colonies in the Atlantic Ocean occur on Ascension Island, Aves Island, Costa Rica, and Surinam (NMFS and USFWS 1991b). Nesting in the United States occurs in small numbers in the U.S. Virgin Islands and on Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties. North Carolina is near the northern limits of its nesting area.

Nesting habits for the green turtle are very similar to the loggerhead turtle, with only slight differences. Average clutch sizes range from 110 to 115 eggs, though this varies by population, and only occasionally do females produce clutches in successive years. Usually two, three, four, or more years occur between breeding seasons (NMFS and USFWS 1991b).

Green turtles nest sporadically at Cape Lookout National Seashore with a total of 11 nests since 1990. A peak of four nests was documented in 1998.

LEATHERBACK TURTLE

Leatherback nesting grounds are distributed circum-globally, with the largest known nesting area occurring on the Pacific Coast of southern Mexico. Nesting in the United States occurs primarily in Puerto Rico, the U.S. Virgin Islands, and southeastern Florida, with Cape Hatteras National Seashore being the northernmost nesting location on record (Rabon et al. 2004).

Leatherback nesting habits are very similar to the loggerhead turtle, though they tend to begin and end nesting earlier in the year than the loggerhead turtle (NMFS and USFWS 1992a). Leatherbacks are thought to migrate to their nesting beach about every two to three years (NMFS and USFWS 1992a; Miller 1997). Clutch sizes average 116 eggs, and the incubation period averages 55 to 75 days. It is also reported that leatherback turtles nest an average of five to seven times per year, with an average interval of 9 to 10 days between nesting (NMFS and USFWS 1992a).

Leatherback nesting at Cape Lookout National Seashore is rare, with only fourteen nests recorded since 1990. In 2000, the first nest since 1966 was found at the seashore, and the three confirmed nests in 2004 may have been from a single female given the 6- to 13- day intervals between nests (Cordes and Rikard 2004). It is known, though, that more than one individual leatherback has recently nested in North Carolina, for in 2004 a leatherback turtle nest was found at Cape Hatteras National Seashore the same night that one was found at Cape Lookout National Seashore (Lyons 2005a). In 2005, five nests were documented at Cape Lookout National Seashore (M. Rikard, Cape Lookout National Seashore, personal communication with D. Otto, LBG, February 21, 2005).

POTENTIAL THREATS – NESTING ENVIRONMENT

Threats to the loggerhead turtle on nesting grounds, as outlined in their recovery plan (NMFS and USFWS 1991a), are representative of those also faced by green and leatherback turtles.

Storm events, including hurricanes, may destroy nests because of flooding or piling of eroded sand on the nest site. Beach erosion because of wave action may decrease the availability of suitable nesting habitats (Steinitz et al. 1998), which leads to a decline in the nesting rate.

Predation by mammals, birds, and ghost crabs may eliminate productivity on beaches where it is not managed.

Crowding of nesting beaches by pedestrians can disturb nesting females and prevent laying of eggs (NMFS and USFWS 1991a). Furthermore, the use of flashlights and beachfires may deter females from coming up on a beach or interfere with the sea-finding behavior of hatchlings (Witherington and Martin 1996).

Beach driving by ORVs may harm sea turtles by running over nests, which may increase sand compaction and decrease hatching success, or kill pre-emergent hatchlings (NMFS and USFWS 1991a). Beach driving also poses a risk of injury to nesting females and live stranded turtles; can disturb adult females and cause them to abort nesting attempts; can leave ruts that trap or disorient hatchlings attempting to reach the ocean (Hosier et al. 1981); and can interfere with sea-finding behavior of hatchlings, if headlights are used at night (NMFS and USFWS 1991a). When artificial lighting impairs nesting behavior of nesting females and emerging hatchlings, the affected animals potentially face increased exposure to the elements, exhaustion, and predation.

Artificial lighting on human structures may deter females from coming up on a beach or may disorient hatchlings as they emerge from nests and try to find the sea (Witherington and Martin 1996). Beach cleaning can directly destroy nests. Poaching is a problem in some countries, and it occurs at a low level in the United States.

An increased human presence may lead to an increase in the presence of domestic pets that can depredate nests, and may lead to an increase in litter that may attract wild predators. Trampling can increase sand compaction that may damage nests or hatchlings.

Recreational beach equipment and furniture can also cause turtles to forgo egg laying by hampering or trapping animals attempting to locate a nesting site. They can also trap emerging hatchlings.

The rate of habitat loss because of erosion and escarpment may be increased when humans attempt to stabilize the shoreline, either through re-nourishment or placement of hard structures, such as sea walls or pilings. ORV traffic may alter the beach profile, leading to steeper fore dunes, which may be unsuitable for nesting. Improperly placed erosion-control structures, such as drift-fencing, can act as a barrier to nesting females. Humans may also introduce exotic vegetation in conjunction with beach development, which can overrun nesting habitat or make the substrate unsuitable for digging nest cavities.

THREAT OCCURRENCES AT CAPE LOOKOUT NATIONAL SEASHORE

The following data are from the Cape Lookout National Seashore annual sea turtle surveying reports, 1997 to 2004, and include all turtle species (Cordes and Rikard 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004).

The majority of nest losses at Cape Lookout National Seashore from 1990 to 2004 were weather-related, particularly from hurricanes and other storms. During this timeframe, an average of 22 nests were lost due to flooding from storms, ranging from a low of 1 nest lost in 1990 to a peak of 90 nests in 1999. In recent years, Hurricane Isabel had a great impact on the 2003 nesting season. A total of 60 nests were flooded during the storm with 45 nests being washed away, buried, or failing to hatch due to flooding. During the 2004 season, Hurricane Alex and several other storms flooded a total of 53 nests, with a total of 36 nests being washed away or failing to hatch due to flooding.

Other natural threats to sea turtle nests at the Seashore include predation by ghost crabs and raccoons. From 1997 to 2004 raccoons depredated an average of 12 nests, ranging from zero nests in 2004 to 28 nests in 2000. Ghost crab depredated an average of four nests from 1997 to 2004, though the total number of eggs lost is not known. Roots from plants have also destroyed eggs or trapped hatchlings. Root invasion did not affect any nests in 1997 and 2004, but affected 7 nests in both 1999 and 2000.

Violation of closed areas by ORVs is also a problem at the seashore and threatens the survival of hatchlings. Violations include driving between posts and the ocean at low tides and pulling up posts and rope and driving through the closure. These violations can leave ruts that impede hatchlings on their way to the ocean or can result in vehicles driving over hatchlings. Since 1999, an average of 37 violations has occurred each year, ranging from a peak of 70 in 1999 to a low of 10 in 2004.

Light pollution is occasionally a problem as well. Since 1997, hatchlings from nine different nests have been documented as being disoriented by artificial light and crawling inland away from the ocean. Hatchlings from another four nests also crawled inland away from the ocean; however, the nests were located in areas relatively free from artificial light and may have been confused by the local topography instead of lights.

SEABEACH AMARANTH

Seabeach amaranth (*Amaranthus pumilus*) is an annual plant, native to barrier island beaches along the U.S. Atlantic Coast, including those within the Cape Lookout National Seashore. Historically, seabeach amaranth was found in nine states, from Massachusetts to South Carolina, but was federally listed as threatened by the U.S. Fish and Wildlife Service in 1993 because of its vulnerability to human and natural impacts and the fact that it had been eliminated from two-thirds of its historic range (USFWS 1996b). Since its listing, seabeach amaranth has reappeared in several states and is currently found in New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina. Despite its reappearance

in several states, the plant remains highly vulnerable to the threats that caused its listing, and in some states, populations continue to decline (USFWS 2005).

This species is also listed as threatened by the State of North Carolina, and according to recent survey data compiled by USFWS in 2005, the number of plants in North Carolina since 2000 has ranged from 202 to 21,966 (Dale Suiter, USFWS, unpublished data). These numbers represent only a fraction of the reports of approximately 40,000 plants in the late 1980s and 1995. For example, within Cape Hatteras National Seashore, seabeach amaranth numbers ranged from just over 3,000 plants to nearly 16,000 plants between 1987 and 1990, but only 1 to 133 individuals have been found annually since the year 2000. The number of plants at Cape Lookout National Seashore has also been extremely variable (see table 12). This variability is due mainly to habitat changes and the impact of hurricanes, for in years following major storms (1996, 1999, 2000, 2004) few plants were found within the seashore. Presumably, plants were either killed before they set seed, or the seeds were buried or washed away. However, following a growing season without major storm impacts the population did recover.

TABLE 12: ANNUAL COUNTS OF NATURALLY OCCURRING PLANTS OF SEABEACH AMARANTH AT CAPE LOOKOUT NATIONAL SEASHORE

Year	North Core Banks	South Core Banks	Shackleford Banks	Cape Lookout National Seashore Total
1993	82	1,208	975	2,265
1994	63	641	948	1,652
1995	30	45	1,155	1,230
1996	1	0	3	4
1997	2	0	51	53
1998	121	4	369	494
1999	2	0	9	11
2000	0	4	13	17
2001	8	43	126	177
2002	2	69	261	332
2003	1	205	1,354	1,560
2004	1	78	58	137
2005	0	284	669	953

Seabeach amaranth is a low-growing annual, with stems that trail along the ground but do not root. The stems are reddish in color, fleshy, grow to 4 to 24 inches in length, and have round, fleshy, dark-green leaves (0.4 to 0.6 inches long) clustered near the tips. Plants must recruit annually from seed banks, either in-place or from other source populations dispersed by wind, water, or from sediments distributed by anthropogenic (human) factors, for example, beach re-nourishment (Jolls et al. 2004). Seeds must be scarified (the seed coat broken by nicking or abrasion) or cold stratified (chilling for weeks) before germination can occur (Baskin and Baskin 1998; Blazich et al. 2005; Jolls et al. 2001). Germination takes place from April through July, initially forming a small sprig that soon begins to branch into a clump. At Cape Hatteras National Seashore, seedlings are usually visibly detectable beginning in June (Lyons 2005b), and this is likely to be the case at Cape Lookout National Seashore as well. Plants are typically 10 to 12 inches in diameter, consisting of 5 to 20 branches, though occasionally a clump may get as large 3 feet or more across, with over one hundred branches (USFWS 1993; NJDEP 2005).

Flowering begins when plants are of sufficient size, often beginning in June, but more typically beginning in July, and continuing until the plants die in late fall or early winter. The species is a prolific seed producer, with seed production beginning in July or August and reaching a peak usually in September.

Seed production continues until the plant dies. The seeds are relatively large (0.1 inch), believed to be viable for long periods of time (decades), and are contained in indehiscent utricles (a fruit pouch that does not split open spontaneously at maturity to release its seed). Though the utricles are normally indehiscent, it is not unusual to see them splitting open, either before or after their detachment from the plant. Splitting or fragmentation of the utricle occurs under conditions of agitation (by wind), abrasion (by sand), or simple loss of integrity over time (USFWS 1996b).

Seed dispersal may occur by wind or water, though naked seeds do not disperse nearly as far from the parent plants as seeds retained in utricles. Seeds may also be dispersed by human activities, such as beach replenishment programs. Many utricles remain attached to the plant and are never dispersed, allowing seeds and fruit to pile up around the bases of the parent plants. This primarily occurs at the end of the growing season, when the plant dies (USFWS 1996b).

Seabeach amaranth occupies a fairly narrow habitat niche. It is found on sandy ocean beaches, where its primary habitat consists of overwash flats at accreting ends of islands and the sparsely vegetated zone between the high-tide line and the toe of the primary dune on noneroding beaches. It is intolerant of competition and does not occur on well-vegetated sites. It is also intolerant of even occasional flooding or overwash. Populations are occasionally found in other habitats, including back dunes, soundside beaches, blowouts in foredunes, and beach-replenishment areas, but these populations tend to be small and temporary (USFWS 1996b and NJDEP 2005). In general, to survive, this species needs extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner, to allow it to move around in the landscape as a fugitive species, occupying suitable habitat as it becomes available (USFWS 1993).

At Cape Lookout National Seashore most of the plants are found on the south facing beaches of Shackleford Banks and the area between Cape Lookout Point and Power Squadron Spit where there is little beach erosion. In the early 1990s there was a large population on the south side of New Drum Inlet; however, the seed bank in that area was lost in Hurricane Gordon in 1994 and the plant has yet to recover there.

The predominant threat to seabeach amaranth is the destruction or alteration of suitable habitat, primarily because of beach stabilization efforts and storm-related erosion (USFWS 1993). Seabeach amaranth occupies a narrow and precarious elevation niche, bounded by its relative intolerance of flooding in lower beach settings and competition with other plants in upper beach and dune settings. Its placement within upper beach and overwash area habitats is severely limiting because these areas are often absent on barrier islands that are experiencing beach erosion. Historically, in both Cape Lookout National Seashore and Cape Hatteras National Seashore, surveys have found very few seabeach amaranth plants on east- and northeast- facing beaches, which experience the greatest erosion rates. South-facing beaches have lower erosion rates and likely provide better habitat for seabeach amaranth.

Other important threats to the plant include: (1) beach grooming; (2) some forms of “soft” beach stabilization, such as sand fencing and planting of beach-grasses; (3) vehicular traffic, which can easily break or crush the fleshy plant and bury seeds below depths from which they can germinate; and (4) predation by webworms (caterpillars of small moths) (USFWS 1993). Webworms feed on the leaves of the plant and can defoliate the plants to the point of either killing them or at least reducing their seed production.

STATE-LISTED AND SPECIAL STATUS SPECIES

AMERICAN OYSTERCATCHER

The American oystercatcher (*Haematopus palliatus*) is a large (16–18 inches long, 14–24 ounces) and conspicuous shorebird with long pink legs and a long, bright reddish-orange bill. The upper body is

comprised of black feathers that contrast with white feathers on the breast and sides. The sexes are similar in appearance though females are slightly larger than males.

Oystercatchers are restricted to marine environments where they inhabit coastal salt marshes and sandy beaches along the Atlantic seaboard where they feed primarily on bivalve mollusks (Nol and Humphrey 1994; Meyers 2005).

Oystercatchers form pair bonds in February and early-March and courtship takes place in salt marshes, on dunes, beaches, dredge spoils, and oyster bars. They breed from March to August along the Atlantic coast from Massachusetts to Florida in relatively high, open, sandy areas with sparse to no vegetation (Nol and Humphrey 1994; Meyers 2005).

AMERICAN OYSTERCATCHER IN NORTH CAROLINA

North Carolina supports approximately 327 pairs of American oystercatchers, a large, conspicuous shorebird with long pink legs and a long, bright reddish orange bill. The Outer Banks region of North Carolina is estimated to support 90 breeding pairs or 27% of the state's oystercatchers (Simon et al. 2004), along 100 miles of beach (Cameron and Allen 2004). Oystercatcher breeding success in North Carolina has been extremely low — one egg in 32 hatches (Davis et al. 2001). In response to low reproductive rates in 2005, the North Carolina Wildlife Resources Commission (NCWRC) and the Southeastern Shorebird Conservation Plan proposed for listing the American oystercatcher as a state-listed species of special concern (Meyers 2005). The listing has yet to be approved by the state General Assembly (Gerwin 2005).

Habitat Description

In North Carolina, American oystercatcher nesting habitat comprises sandy sites characterized by more substrate and less vegetation, farther from water (70–105 feet), and slightly elevated (to afford at least a 180-degree view) (Lauro and Burger 1989; Zaradusky 1985; Shields and Parnell 1990). Vegetation, which can include *Spartina sp.*, *Ammophila sp.*, *Lathyrus sp.*, and *Solidago sp.*, is variable and averages 23–50% around some nest sites (Lauro and Burger 1989). Elevation of nest habitat and distance to the water are both important to nest success (Lauro and Burger 1989). Distance to the nearest oystercatcher nest depends on habitat, but typical inter-nest distances range from 400 to 625 feet (Lauro and Burger 1989). Oystercatchers are more common in habitat with few predators, especially areas without domestic dogs and cats (Nol and Humphrey 1994). Oystercatcher foraging habitats include oyster and mussel bars and intertidal sand and mud flats. Winter and summer foraging habitats are similar (Nol and Humphrey 1994).

Diet

The elongated and laterally compressed bill of the Oystercatcher is well-suited to allow opening and preying upon marine bivalves, including oysters (*Crassostrea virginica*), soft-shell clams (*Mya arenaria*), razor clams (*Ensis directus*), stout razor clams (*Tagelus plebeius*), and ribbed mussels (*Geukensia demissa*). Other items include, marine worms, mole crabs (*Emerita talpoida*), sandworms (*Nereis pelagica*), limpets (*Aemaeu sp.*), jellyfish (Coelenterata), sea urchins (*Strongylocentrotus sp.*), starfish (*Asteria spp.*), and crabs (Bent 1929; Tomkins 1944; Cadman 1979; Johnsgard 1981; Nol 1989).

Breeding Biology

The major stages of the American oystercatcher nesting cycle include the following: establishment and holding of nesting territories, courtship and copulation, nest scraping and nest building, egg laying, incubation, chick rearing, and fledging. Breeding pairs of oystercatchers begin nesting late-February and early-March by establishing and holding a nesting territory and then scraping multiple shallow depressions in the sand. Eventually, they choose one scrape in which to build a nest (Nol and Humphrey 1994; McGowan et al. 2005). Nests are 1.5–2.5 inches deep and 7–8 inches across and may contain shell fragments, dead plants, small stones, and beach debris (Baicich and Harrison 1997). In North Carolina,

nests are rarely more than 70–105 feet from water (Lauro and Burger 1989 in Nol and Humphrey 1994) and are often on an elevated mound, which serves as a lookout for the birds (Baicich and Harrison 1997). Oystercatchers are monogamous and may mate for life (Palmer 1967 in Nol and Humphrey 1994). Oystercatchers can nest in proximity to colonial waterbirds including, but not limited to, common tern (*Sterna hirundo*), least tern (*Sterna antillarum*), and black skimmer (*Rynchops niger*).

Both sexes incubate 3 eggs (rarely 2 or 4 eggs) for 24–28 days and incubation may begin after the second egg is laid (Nol and Humphrey 1994) or after the last egg is laid (Baicich and Harrison 1997). American oystercatchers may re-nest if eggs or nestlings are lost early in the season. Both adults brood nestlings that crouch motionless when alarmed making them difficult to see. Nestlings remain in the nest for 1–2 days and then move with adults within their nesting territory or into nearby foraging areas which can be 150 to 600 feet away, depending on the habitat. Chicks fledge in about 35 days but fledglings depend on adults almost entirely until 60 days old (Palmer 1967; Nol and Humphrey 1994).

Breeding Performance at Cape Lookout National Seashore

American oystercatchers are common nesters throughout Cape Lookout National Seashore, primarily on the ocean beach of the North Core, Middle Core, South Core, and Shackelford Banks (figures 12–14). However, they have experienced very low reproductive success in each year since surveying began in 1995 with an average of only 22% of all nests producing hatchlings and very low numbers of chicks fledging (table 13). For this reason, oystercatchers are listed as a ‘Bird of Conservation Concern’ on the southeast coastal plain and as a breeding species of highest regional priority in the *Southeastern Coastal Plains – Caribbean Regional Shorebird Plan* (Hunter et al. 2003). Nevertheless, in 2004 just over 50% of the nests hatched for the first time since surveying began (NPS 2006). Nests on North Core Banks and Middle Core Banks (figure 12) did particularly well with 80% of the nests hatching. Fledging success was also the highest ever recorded in the seashore and at least 88 chicks hatched with 45 surviving to fledge (51%) (table 13).

Nonbreeding and Wintering

In September, American oystercatchers in the northeastern United States migrate to their wintering grounds from Virginia south along the Atlantic and Gulf coasts. Oystercatchers in North Carolina and in other southern states appear to be non-migratory (Meyers 2005). Hence, in the winter, these southern coastal beaches can support large, mixed flocks of migrant and resident oystercatchers (Kain 1987; Post and Gauthreaux 1989).

Winter and migratory habitat appear to be similar to breeding habitat though there are inadequate data in North Carolina regarding what constitutes preferred habitat in the winter and especially for birds in migration. Limited observations indicate that winter birds roost in open ground without vegetation in areas near foraging habitat (Tomkins 1954; Nol and Humphrey 1994).

Risk Factors

Threats to nesting American oystercatchers are numerous and interrelated, but more than 51% of nest losses are from undetermined causes, which does not allow managers to correct the problem (Simon et al. 2004). Due to their choice of nesting habitat, oystercatchers are particularly vulnerable to disturbance by seashore visitors and off-road vehicles. Major causes of known nest failures (less than 49% of nesting attempts) are mammalian predation (60%); overwash (25%); bird predation (5%); abandonment (5%, possibly another cause); humans (3%); vehicles (less than 2%); and ghost crabs (less than 2%) (Simon et al. 2004). The *2004 Summary Report for American Oystercatcher Monitoring at Cape Lookout National Seashore* identified mammalian predators, particularly raccoons, as the primary cause of nest losses; one oystercatcher chick was run over by a vehicle on South Core Banks at Cape Point; and one was killed by a Great Horned Owl.

Human Activity. Current threats to the American oystercatcher throughout its breeding and wintering range are human disturbance, increasing predators (which is thought to be largely linked to human activity), and development of coastal areas (Bent 1929; Tomkins 1954; Nol and Humphrey 1994). Oystercatchers need large, undisturbed beach areas for successful nesting, which frequently exposes them to human disturbance. Disturbance from pedestrians, vehicles, and unleashed pets can cause the abandonment of nest habitat as well as direct loss of eggs and chicks (Meyers 2005).

Currently, there are only a few studies of the effects of humans and vehicles on the nesting success of American oystercatchers (McGowan 2004; Sabine 2005). Studies of colonial nesting waterbirds such as common terns and black skimmers indicate that set-back distances should be approximately 600 feet from nesting areas (Rogers and Smith 1995; Erwin 1989).

Weathers and Tides. There have been 10 named hurricanes on the Outer Banks between 1993 and 2005 (Cordes 2005b). Storms and high tides reduce nesting success, and overwash accounted for 25% of documented nest failures at Cape Lookout National Seashore.

Predation. Predators on Cape Lookout include feral cats and raccoons (*Procyon lotor*), as well as ghost crabs (*Ocypode quadratus*). Oystercatchers may lay another clutch if predators depredate their nests early in the season (Nol and Humphrey 1994).

Three factors may be contributing to the increase in nesting success in 2004 (NPS 2006). First, hurricane Isabel in September 2003 created large overwash areas, particularly at the northern end of the seashore. These are the areas that had the highest nesting success and areas where the impact from Hurricane Isabel was minor (Shackleford Banks), and nesting productivity was poor. Second, raccoon populations seem to have greatly declined on North Core Banks following the hurricane. Only four nests were lost to predators north of New Drum Inlet. Third, the 2004 nesting season was free of storms and flooding relative to previous years. The combination of these three factors seemed to have produced ideal nesting conditions for many American oystercatchers in 2004.

TABLE 13: SUMMARY OF OYSTERCATCHER REPRODUCTIVE SUCCESS DATA AT CAPE LOOKOUT NATIONAL SEASHORE

Year	Island	Number of Nests	Number of Nests Hatched	Number of Chicks Fledged
1995	South Core Banks	36	10 (28%)	7
1997	South Core Banks	34	4 (12%)	2
1998	North and South Core Banks	98	12 (12%)	6
1999	North and South Core Banks	114	16 (14%)	6
2000	North and South Core Banks	75	25 (33%)	9
2001	North and South Core Banks	109	19 (17%)	1
2002	North and South Core Banks	90	10 (11%)	6
2003	Cape Lookout National Seashore	106	17 (16%)	8
2004	Cape Lookout National Seashore	68	37 (54%)	45
2005	Cape Lookout National Seashore	65	26 (40%)	18
All		795	176 (22%)	108

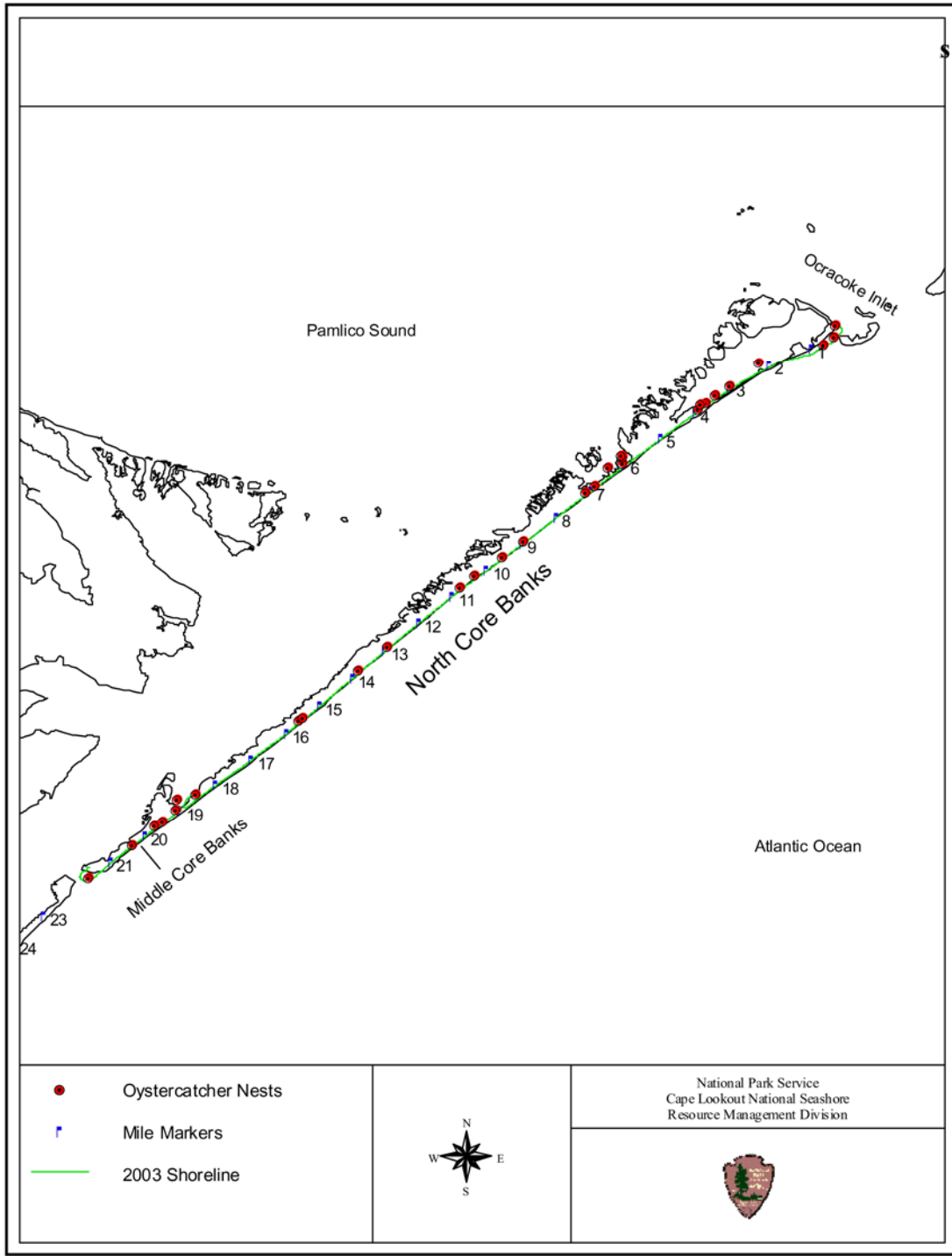
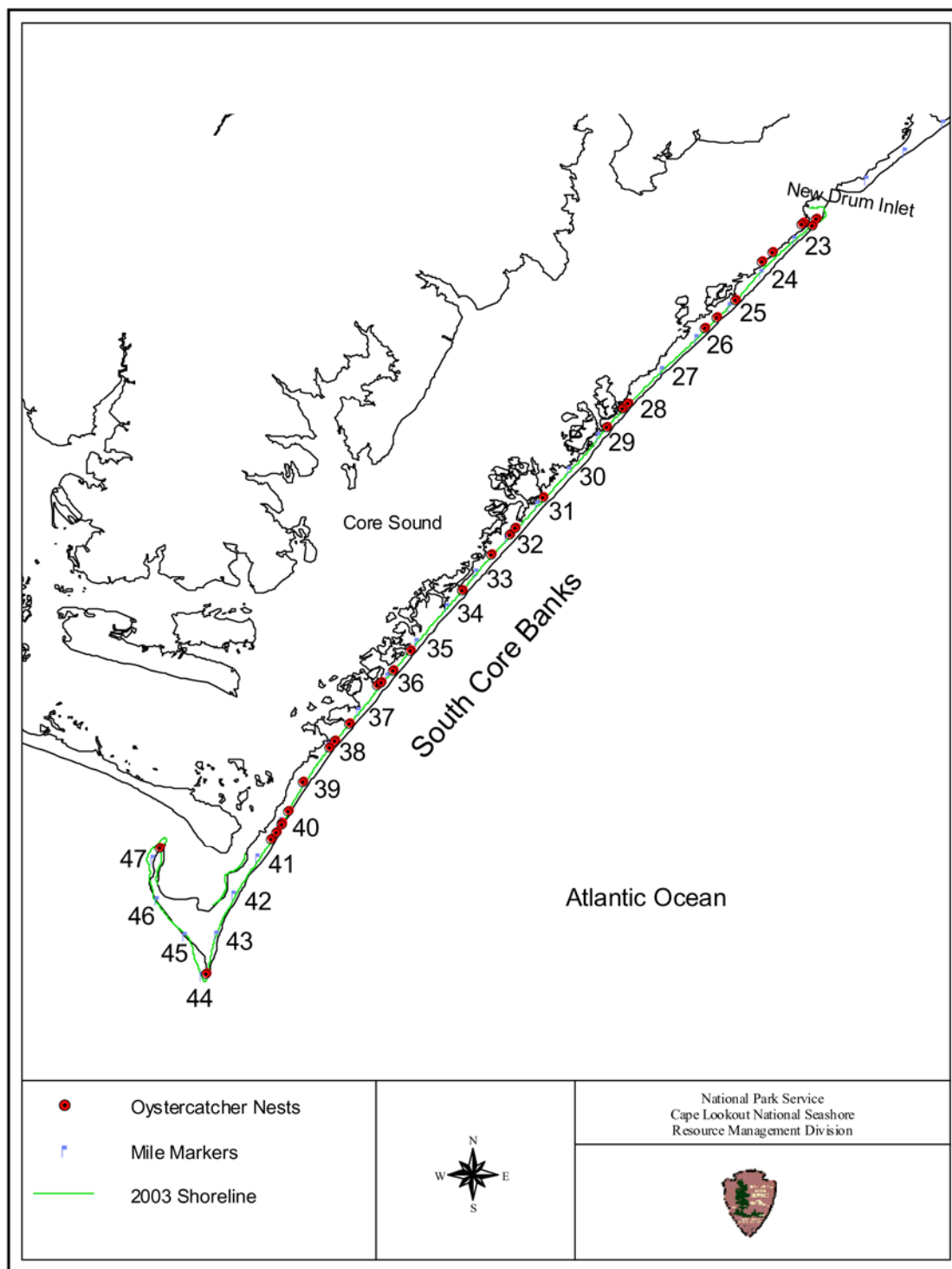
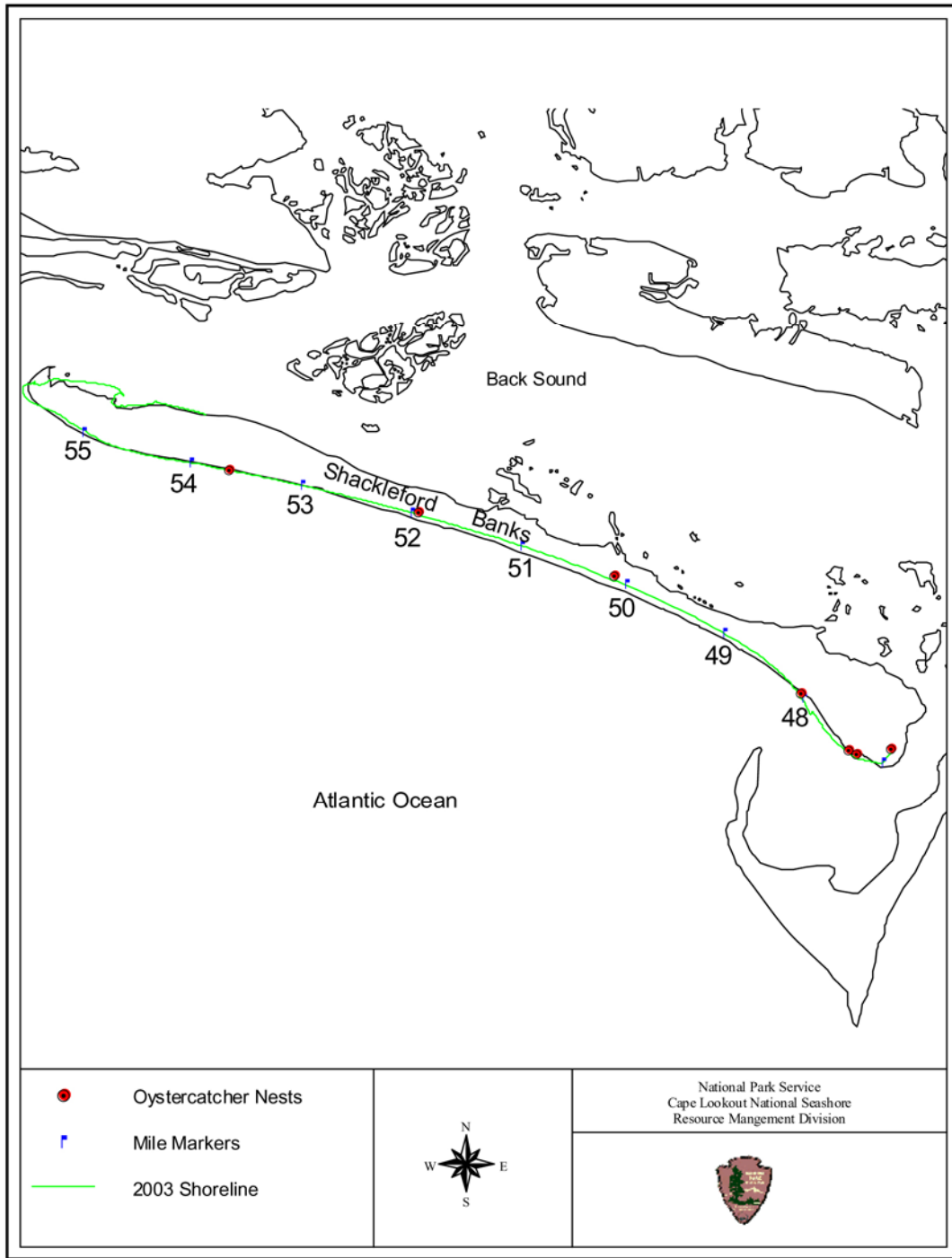


FIGURE 12: AMERICAN OYSTERCATCHER NESTS ON THE NORTH BANKS AND THE MIDDLE CORE BANKS—2004



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FIGURE 13: AMERICAN OYSTERCATCHER NESTS ON SOUTH CORE BANKS—2004



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FIGURE 14: AMERICAN OYSTERCATCHER NESTS ON SHACKLEFORD BANKS—2004

COLONIAL WATERBIRDS

Colonial waterbirds at Cape Lookout National Seashore include gull-billed terns (*Sterna nilotica*), common terns, least terns, and black skimmers. Gull-billed terns are considered to be “threatened” in North Carolina, while the other three are “species of special concern,” both to the North Carolina Wildlife Resources Commission (NCWRC) and to the NPS (Erwin 2005). None of these species are federally listed.

DESCRIPTIONS

Gull-billed Tern

The gull-billed tern is a medium-sized (13 to 15 inches long, weighing about 5.6 to 7.0 ounces) waterbird found widely in Eurasia, the Mediterranean, northern Europe, and the United States. In the United States, it occurs as two subspecies. The Atlantic Coast and Gulf subspecies has been designated *Sterna nilotica aranea*, while the subspecies occurring from the Salton Sea in California, south to western Mexico, is known as *Sterna nilotica van rossemei* (Parnell et al. 1995).

Common Tern

The common tern is a widespread species that can be found across the temperate region of the northern hemisphere. It also occurs in Bermuda and the southern Caribbean region (Nisbet 2002). It is one of the medium-sized, black-capped terns (12 to 14 inches long, weighing 3.8 to 5.1 ounces) (Nisbet 2002). In North America, it is distributed along the Atlantic Coast, the St. Lawrence River, and in most of the Great Lakes (Nisbet 2002).

Least Tern

The least tern is the smallest of the black-capped terns in North America. Five types are recognized in North America, although there are few differences genetically or morphologically among them (Thompson et al. 1997). The least tern weighs only about 1.5 ounces, on average, and is a mere 8 to 9 inches in length (Thompson et al. 1997).

Black Skimmer

The black skimmer is the only waterbird on the Atlantic Coast that feeds by skimming along the surface of the water with its lower jaw. Another unique feature is that males are an average of 35% to 40% larger than females, and both exhibit a high degree of nocturnality. Females average about 9.3 ounces, while males average about 13 ounces. The length of the female ranges from 16 to 24 inches, while males range from 19 to 24 inches (Gochfeld and Burger 1994).

COLONIAL WATERBIRDS IN NORTH CAROLINA

The Outer Banks region of North Carolina supports a large number of colonial waterbird species that depend upon its extensive sounds and the nearshore waters for feeding, and its relatively undisturbed islands for nesting. Most species of colonial waterbirds are in jeopardy in North Carolina (Parnell et al. 1977) because of a decline in numbers over the past 20 to 30 years. During the period from 1977 to 2004, gull-billed terns declined from approximately 268 to only 99 pairs, common terns from 2,760 to only 570 pairs, and black skimmers from 976 to 623 pairs. Least terns however, increased from 1,925 to 2,408 pairs in the same period (NPS 2006).

The reasons for the decline in North Carolina’s colonial waterbirds are many and include at least the following: predation from mammals and birds; competition from large gulls, especially herring gulls (*Larus argentatus*); human disturbance; and recreational disturbances (Parnell et al. 1977, 1995; Erwin et al. 2001; Erwin 2005).

DESCRIPTIONS OF BREEDING, FORAGING, AND MIGRATION/WINTER ROOST HABITATS

Gull-billed Tern

Breeding habitat. Gull-billed terns typically nest among other tern species on open, sandy-shell beaches, on large barrier islands, on dredge-spoil islands, or on overwash fans (also used by piping plovers) that are mostly devoid of vegetation. They also nest on elevated-shell ridges (“rakes”) along the edges of marsh islands that they share with American oystercatchers and common terns (Erwin et al. 1998b; Erwin 2005).

Foraging habitat. In contrast to other terns, gull-billed terns do not feed primarily on fish but are opportunistic, taking insects on the wing, feeding on a variety of invertebrates, including fiddler crabs (*Uca pugnax*), decapods, marine worms, and clams, as well as small marsh fishes (Erwin et al. 1998b). Consequently, gull-billed terns can be seen feeding over marshes, creeks, and along ocean and bay beaches, as well as over agricultural fields many miles from their nesting site (Erwin 2005).

Migration/winter roost habitat. Little is known about the habitat used by migrating gull-billed terns, except that it is generally considered similar to the above (Erwin 2005).

Common Tern

Breeding habitat. Common terns typically nest on open, sandy-shell beaches on ocean coastal islands, as well as at inland island sites in freshwater lakes, or as in Europe, in rivers (Nisbet 2002). However, they also nest in salt marshes, either on shell or on wrack, especially where human disturbance along the beaches is substantial (Erwin 1980, 2005), and even on man-made structures, such as old piers or channel markers (Burger and Gochfeld 1991).

Foraging habitat. Common terns prey on small fishes and shrimp in inlets and along the coast, often within a few miles of their breeding colonies (Nisbet 2002).

Migration/winter roost habitat. There is little information on habitats used by migrating common terns. However, most continue to feed close to shore. Migration staging areas are known at large sandy spits and bars at a number of North Atlantic sites, with concentrations numbering in the thousands at some places (Nisbet 2002). In winter, common terns migrate to the Caribbean and South America, where they often concentrate in large numbers in coastal lagoons (Nisbet 2002).

Least Tern

Breeding habitat. Least terns typically select the barest sand- and shell-covered substrates available on coastal, riverine, or dredge-spoil islands (Thompson et al. 1997). They also nest on rooftops in a number of coastal areas, where pea gravel is used as part of the roofing material (Thompson et al. 1997). On coastal barrier islands, they often select colony sites either adjacent to inlets or in overwash areas that are often interspersed among piping plover nests. Unlike common terns, least terns are typically found in small, monospecific colonies, where their nests are often widely spaced (Thompson et al. 1997).

Foraging habitat. The foraging habitat of least terns is similar to common terns, except that least terns seldom feed in large flocks.

Migration/winter roost habitat. Least terns migrate from the Outer Banks in August and September, with migration flocks staging at certain, sandy island sites (Thompson et al. 1997). In late-July or August, remote sandbars or sandy spits serve as roost sites. Least terns winter from Florida through the Caribbean and into Central and South America (Thompson et al. 1997).

Black Skimmer

Breeding habitat. Black skimmers prefer to nest on open, sandy substrates on barrier and dredge-spoil islands or at the tips of barrier islands (Gochfeld and Burger 1994). They invariably nest with other tern

species along the Atlantic Coast (Erwin 1977, 2005). Black skimmers occasionally nest on wrack or on shell ridges in salt marshes, and even on rooftops with least terns (Gochfeld and Burger 1994).

Foraging habitat. Black skimmers feed on small fishes, shrimp, and other invertebrates that they capture by skimming the surface with their lower jaws just below the surface of the water. They typically feed very close to their nesting colonies and prefer quiet waters in salt marsh creeks, lagoons, or in protected coves and inlets near barrier islands (Erwin 1977, 2005; Gochfeld and Burger 1994).

Foraging habitat. Black skimmers migrate from the Outer Banks region from September to November, forming very large concentrations on sandy spits and sandbars (Gochfeld and Burger 1994). They winter from Florida through the Caribbean and South America (Erwin 1980, 2005; Gochfeld and Burger 1994).

Diet

Gull-billed tern

The gull-billed tern is opportunistic, taking insects on the wing and feeding on a variety of invertebrates, including fiddler crabs, decapods, marine worms, clams, and small marsh fishes (Erwin et al. 1998b; Erwin 2005).

Common tern

The common tern's diet consists of small fishes and shrimp found in inlets and along the coast. Common terns often feed in large flocks, and within a few miles of their breeding colonies (Nisbet 2002).

Least tern

The diet of least terns is similar to that of common terns, except that least terns seldom feed in large flocks (Erwin 2005).

Black skimmer

Black skimmers feed on small fishes, shrimp, and other invertebrates that they capture by skimming the surface with their lower jaws just below the water's surface (Erwin 1980; Gochfeld and Burger 1994).

Breeding Biology

Gull-billed tern

These birds arrive in North Carolina by mid-April. The mating system is monogamous, and like many other waterbirds, gull-bills probably have long-lasting pair bonds. Nest-site establishment and egg laying usually occur in mid- to late-May. The nests consist of a shell-lined scrape in the sand, or, sometimes, on wrack in salt marshes. Nests contain from 2 to 3 brownish-blotched eggs (in the U.S., the means is around 2.2 eggs per nest [Parnell et al. 1995]) that are incubated for 22 to 23 days. Both members of a pair share incubation duties, but females take the dominant role. Both parents share brooding duties, and both feed the young, often for an extended period after fledging occurs (birds generally fledge at 26 to 30 days of age). The chicks are highly camouflaged and more mobile than either common tern or black skimmer chicks, with which it coexists. The young may leave the immediate area of the nest within a few days if disturbance is high. Pairs may re-nest if a nest is lost early in the breeding season (Erwin 2005).

Common tern

Birds arrive in North Carolina in late-April to early-May and begin nesting most years from mid-May to early-June (Nisbet 2002). The mating system is monogamous, and like many other waterbirds, gull-bills probably have long-lasting pair bonds. Clutch sizes vary, but three, medium-dark-brown, mottled eggs are the norm. The eggs are incubated for 22 to 23 days. Both sexes incubate and feed the brood. As in other terns, feeding of the young occurs post-fledging and can continue into the fall migration. Upon hatching,

the young remain near the nest (unless disturbed) for the entire prefledging period. Re-nesting may occur if early nests fail. Fledging ranges from about 25 to 30 days. Common terns appear to serve as a social locus for mixed-species colony formation, possibly because of their aggressive, protective nature (Erwin 1979, 2005; Nisbet 2002). Hence, gull-billed terns and black skimmers often nest among common terns (Erwin 2005).

Least tern

Birds arrive in North Carolina from late-March to mid-April. Unlike most other Outer Banks terns, least terns usually nest in single-species colonies, with nests often spread out. Courtship lasts for 2 to 3 weeks in April and May, and egg laying occurs from late-May until June. Clutch sizes range from 1 to 3 eggs, with 2 the norm in North Carolina. Eggs are highly camouflaged, with the background color beige to light, olive brown. Both members of a pair share incubation duties, but females take the dominant role. Incubation lasts for 21 to 22 days, and the highly mobile young move from the nest within a few days. They are able to fly at about 20 days of age. Post-fledging parental feeding can occur for several weeks away from the colony (Thompson et al. 1997; Erwin 2005).

Black skimmer

Birds arrive in North Carolina from late-April to mid-May, and nest building and egg laying usually occur from late-May to mid-June (Erwin 1977, 2005; Gochfeld and Burger 1994). Clutch sizes range from 2 to 4 eggs (Erwin 1977). Eggs are light buff with black blotches and are laid and hatch asynchronously. Both sexes incubate the eggs, brood, and feed the young. Incubation ranges from 22 to 25 days. The young remain near the nest (unless disturbed) for most of the prefledging period of 28 to 30 days (Erwin 1977). As with other waterbirds, if nests fail early in the season, skimmers will re-nest (sometimes several times). Skimmers are sometimes seen incubating eggs as late as August in the mid-Atlantic region (Burger and Gochfeld 1990). Fledged young are fed by their parents, often right up until migration (Erwin 1977, 2005).

Breeding Performance at Cape Lookout National Seashore

Colonial waterbird breeding at Cape Lookout National Seashore occurs between May and August. In many cases, colonial waterbirds use areas already closed to the public for breeding American oystercatchers and piping plover (figure 15) (NPS 2006).

At Cape Lookout National Seashore all colonial waterbirds have declined since 1992 and for gull-billed and common terns the decline has been dramatic (table 14) (NPS 2006).

TABLE 14: ESTIMATES OF COLONIAL WATERBIRD NESTING (IN NESTING PAIRS) AT CAPE LOOKOUT NATIONAL SEASHORE FROM SELECTED YEARS, 1992 TO 2004

Species	1992	1993	1995	1997	1998	1999	2001	2004
Gull-billed Tern	59	57	35	2	-	0	0	0
Common Tern	242	582	258	9	41	-	5	28
Least Tern	363	583	236	179	236	131	96	218
Black Skimmer	111	307	185	28	10	-	33	72

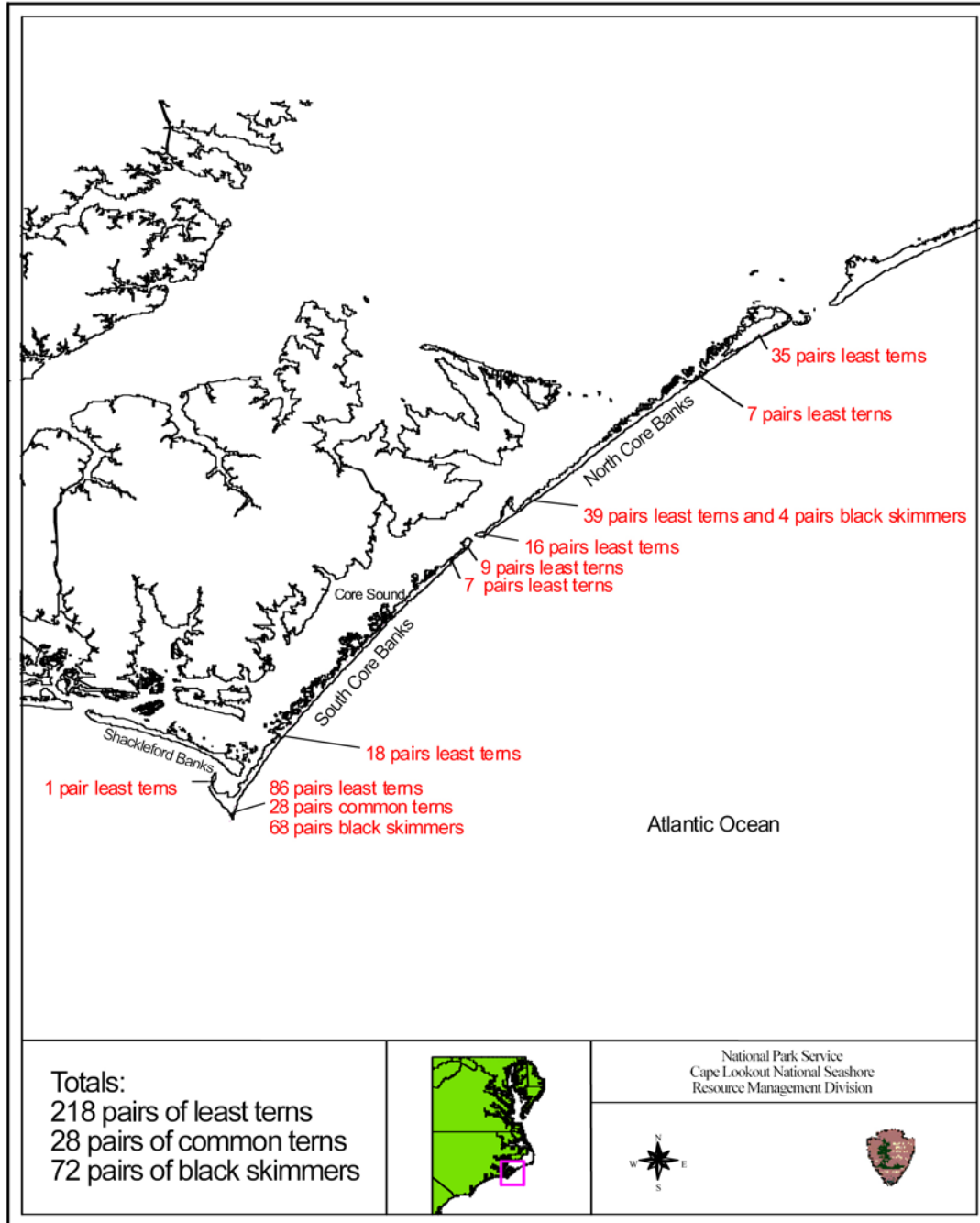


FIGURE 15: COLONIAL NESTING BIRDS AT CAPE LOOKOUT NATIONAL SEASHORE—JUNE 2004

A summary of trends for colonial waterbirds at Cape Lookout National Seashore follows:

Least Tern

Apparently Stable. The number of nesting pairs fluctuates (583 nesting pairs in 1993 to 218 pairs in 2004) but the long-term population at Cape Lookout National Seashore seems to be stable. Accurate counts of nesting least terns can be difficult because of high rates of nest losses. The least tern is a species of “high conservation concern” on the North Carolina Bird Watchlist.

Common Tern

Declining. The number of nesting pairs in the seashore fell from 582 in 1993 to only 28 in 2004. The common tern is a species of “high conservation concern” on the North Carolina Bird Watchlist.

Gull-billed Tern

Declining. The gull-billed tern is now rare at Cape Lookout National Seashore as a nester. The number of nesting pairs in the seashore fell from more than 50 in 1992 and 1993 to none in 2004. This species is listed as “threatened” by the state of North Carolina.

Black Skimmer

Declining. The number of nesting pairs fell from over 300 in 1993 to 72 in 2004. This species is listed as a state species of special concern.

Nonbreeding and Wintering

Gull-billed tern

Fledged young and adults usually leave North Carolina’s colonies by August, moving north for a short period before turning south for the fall and winter. Little is known of concentration areas during migration or winter, although wintering birds are known in Florida and the Gulf coastal region, from western Florida, all the way south to Honduras and Panama on the west coast (Parnell et al. 1995; Erwin 2005).

Common tern

Fledged young and adults usually leave North Carolina’s colonies in late-July to August. They often move north before staging at sandbars near inlets in September and then heading south. Little information is known about winter range, but they are known from Florida, south through the Caribbean, to Peru and southern Brazil, where tens of thousands have been recorded in late winter (Nisbet 2002).

Least tern

Fledged young and adults usually leave North Carolina’s colonies in late-July to August, after breeding, and also move northward into the New York to New England region, before turning south to South America and the Caribbean. However, data are very limited on winter ranges (Thompson et al. 1997). Like other terns, least terns tend to congregate at staging areas along the Gulf Coast in August before departing for the winter (Thompson et al. 1997; Erwin 2005).

Black skimmer

Fledged young and adults usually leave North Carolina’s colonies by early-August and disperse northward before heading south. Large flocks congregate at staging areas, often with terns. Adults may remain with their young during fall migration. Most birds from the mid-Atlantic region winter from southern North Carolina to Florida, the Caribbean, and into Central and South America (Gochfeld and Burger 1994; Erwin 2005).

Risk Factors

Human Activity. All ground-nesting, colonial waterbirds are highly vulnerable to direct human activities such as ORVs, aircraft disturbances, pedestrians, photographers, wildlife managers and scientists, and even poachers (Buckley and Buckley 1976; Erwin 1980, 2005). Indirect effects from human activity include such factors as sonic booms from military operations, the presence of both domestic and feral animals, and the leaving of garbage that subsequently attracts both bird and mammalian predators. Even modest disturbances early in the spring, when the birds are first arriving and prospecting for breeding sites, can be highly disruptive to colonial species (Buckley and Buckley 1976). These studies indicate that set-back distances should be approximately 600 feet from nesting areas (Rogers and Smith 1995; Erwin 1989, 2005).

Weathers and Tides. There have been 10 named hurricanes on the Outer Banks between 1993 and 2005 (Cordes 2005b). The effects of major hurricanes (e.g., Floyd in 1999) caused major declines in water conditions, as well as in marine life, throughout Pamlico Sound in North Carolina for an extended period (Mallin 2000).

Predation. Predators of colonial waterbirds at Cape Lookout National Seashore include feral cats, raccoons (*Procyon lotor*, and ghost crabs). Foxes are currently not found at the seashore. Raccoons and feral cats have increased in recent years as human populations have grown in coastal regions (Buckley and Buckley 1976; Chabreck 1988; Erwin et al. 2001; Erwin 2005). The result of this predation has been poor reproduction or major redistributions of species (Erwin et al. 2001; Erwin 2005). In addition, gulls are often predators on terns as well as competitors for nesting space (Nisbet 2002). These include great black-backed gulls (*Larus marinus*), herring gulls, and the smaller laughing gulls (*L. atricilla*). In addition, in certain areas, other bird species may prey on terns and skimmers (or their eggs), such as peregrine falcons (*Falco peregrinus*), great-horned owls (*Bubo virginianus*), fish crows (*Corvus ossifragus*), and others (Erwin 2005).

Environmental pollutants. A number of chemicals in the environment may be detrimental to the survival and/or reproduction of colonial waterbirds. Environmental contaminants are believed to cause reproductive failure in common terns, one of the more sensitive seabirds to organochlorine chemicals (Nisbet 2002). Problem areas that have been researched in North America are mostly in the U.S. and Canadian Great Lakes region (Nisbet 2002). No evidence of any population-wide wildlife effects of agricultural contaminants has been documented for the Outer Banks region (NPS 2006).

Foraging habitat availability. Unlike foraging habitats of plovers and oystercatchers, the habitats of feeding colonial waterbirds are not contiguous with their breeding areas. Least terns, common terns, and black skimmers usually feed from 1 to 10 kilometers from their nesting colonies in shallow waters (Erwin 1978; Burger and Gochfeld 1990), while gull-billed terns feed on invertebrates primarily in marshes and over upland habitats (Parnell et al. 1995). Few data are available on trends in either forage fish populations in coastal waters, or on invertebrates to indicate whether there are current threats to foraging habitats (NPS 2006).

WILSON'S PLOVER

Wilson's plover is a medium-sized, ringed plover of coastal habitats. Its overall length is 6.5 to 7.5 inches, and its weight ranges between 2 and 2.5 ounces. At all times of the year and in all plumages, its bill is entirely black, large, and heavy; its upperparts are generally grayish to grayish brown, and its underparts are white, with a black-to-brownish breast-band; and its legs and feet are flesh-colored to pinkish. It is readily distinguished from other, similar, ringed plovers by its larger size; large, heavy, all-black bill; and flesh-colored legs. The piping plover is smaller, has obviously paler upperparts, orange legs, and a much smaller, stubbier, two-toned bill (its base is orange-yellow, and its tip is black) (Corbat and Bergstrom 2000; Hayman et al. 1986; Howell and Webb 1995).

DISTRIBUTION

Breeding. Wilson's plover is distributed locally along the Atlantic Coast, from Virginia south to southern Florida, including the Florida Keys, and from southern Florida west along the Gulf Coast to Veracruz, Mexico, the Yucatán, and Belize (Stevenson and Anderson 1994). Breeding locations are uncertain farther south along the Caribbean coast of Central America.

In South America, Wilson's plover breeds locally along the Atlantic coast, from Colombia south to Brazil, including the islands of Trinidad, Aruba, Bonaire, Margarita, and Curaçao, located off the coast of Venezuela (Meyer de Schauensee and Phelps 1978). In the West Indies, it breeds throughout the Bahamas, the Greater Antilles, the Virgin Islands, the Lesser Antilles, and in the Grenadines (Raffaele et al. 1998).

Along the Pacific Coast, Wilson's plover breeds locally along the west coast of Baja California, and from the Gulf of California south to Nayarit, Mexico (Howell and Webb 1995). Farther south along the Pacific coast, it breeds in El Salvador (Thurber et al. 1987) and Panama, while in South America, it breeds along the entire Pacific Coast, from Colombia south to Peru (Hilty and Brown 1986).

Wintering. Wintering occurs mainly in northeast and central Florida (Robertson and Woolfenden 1992) as well as in west Louisiana and south Texas throughout the remainder of the breeding range, to northern South America (Hayman et al. 1986). There are no data pertaining to Wilson's plover nonbreeding or wintering at Cape Lookout National Seashore (NPS 2006).

Wilson's Plover in North Carolina and at Cape Lookout National Seashore

The North Carolina coast had approximately 232 pairs of Wilson's plover in 2004 (Cameron 2004). At Cape Lookout National Seashore, 61 nesting pairs were counted in the 2004 survey. The birds were distributed throughout the seashore, with the greatest concentration at Power Squadron Spit. Piping plovers and American oystercatchers also use many of their nesting sites (NPS 2006).

Population trends and nesting productivity of Wilson's plovers at Cape Lookout National Seashore are unknown. It is likely they face the same threats as other ground nesting species, including flooding and predation. In 1994, 22 of 29 surveyed nests on North Core Banks were lost to predators (NPS 2006).

Habitat Description

Wilson's plover are typically associated with coastal areas of high salinity and sparse vegetation, including salt flats, coastal lagoons, sand dunes, predunes, and overwash areas above the high-tide line (Tomkins 1944; Johnsgard 1981; Bergstrom 1982; Hayman et al. 1986; Corbat 1990; Corbat and Bergstrom 2000).

At Cape Lookout National Seashore, Wilson's plover's breeding sites have only been known to occur, as well, within piping plover breeding sites. Hence, all closures and much of the management of piping plovers, also apply, albeit indirectly, to Wilson's plover (NPS 2006).

All piping-plover breeding sites (and thereby, indirectly, but not officially, those of Wilson's plover) at Cape Lookout National Seashore were designated as critical habitat for wintering birds, as defined by the Endangered Species Act (Federal Register 2001).

Diet

Wilson's plover is a visual feeder of crustaceans, particularly fiddler crabs; and some insects (Strauch and Abele 1979; Morrier and McNeil 1991; Thibault and McNeil 1994), which they prey upon at intertidal mudflats, sand flats, ephemeral pools, and shores of brackish ponds. They usually forage at low tide on intertidal mudflats (Strauch and Abele 1979; Thibault and McNeil 1994; Corbat and Bergstrom 2000).

Breeding Biology

Before territories are established in mid-March to early-April (Tomkins 1944; Bergstrom 1988), Wilson's plovers form pairs, and most breeding territories are established by mid-April (Corbat 1990). As with the piping plover, the nest is a scrape in sand that requires little construction (Bergstrom 1982). Egg-laying can peak from late-April through late-May (Bergstrom 1982). Re-nesting after failure of the first nest continues through the end of June. The estimated time required to complete a clutch of 3 eggs is 3 to 5 days (Bergstrom 1988; Corbat and Bergstrom 2000).

Reproductive Success at Cape Lookout National Seashore

There are no data pertaining to Wilson's plover reproductive success at Cape Lookout National Seashore (NPS 2006).

Risk Factors

Loss of beach habitat and disturbance to nesting areas are the primary threats to the species (Corbat and Bergstrom 2000). In 2004 in North Carolina most Wilson's plovers (87%) were found nesting on barrier islands in early successional habitat on beaches. Undeveloped beaches including Cape Hatteras and Cape Lookout National Seashores supported 63% of the Wilson's plovers in the state (Cameron 2004). Subject to disturbance at nest sites by beachgoers, pets, and vehicle traffic on beaches, Wilson's plovers leave their nests and/or chicks when disturbed and are cautious to return when intruders are near. This exposes eggs and chicks to predation (Corbat and Bergstrom 2000). Predators at Cape Lookout National Seashore include feral cats, raccoons, and ghost crabs (NPS 2006).

Existing Protection Measures (Surveying and Management)

In the United States, there is no federal protection status for Wilson's plover. Wilson's plover has been proposed for listing as a state-listed species of special concern and is identified in the U.S. Shorebird Conservation Plan as a "Species of High Concern" (USFWS 2004a). Wilson's plover is also listed as endangered in Virginia and Maryland, threatened in South Carolina, rare in Georgia, and state-protected in Alabama. Brown et al. (2000) list Wilson's plover as a "species of high concern" in their prioritization of shorebird species according to relative conservation status and risk (Corbat and Bergstrom 2000).

RED KNOT

The red knot is a shorebird that breeds in the Canadian Arctic and is known to only visit the entire eastern seaboard of the United States, including the Outer Banks, Cape Lookout National Seashore, Cape Hatteras National Seashore, and other parts of North Carolina, as a migrant and an occasional winter resident (Harrington 2001). Therefore, only those aspects of the red knot's life history pertinent to its management and conservation in North Carolina, the Outer Banks, and at Cape Lookout National Seashore, will be covered in this section.

EMERGENCY ENDANGERED LISTING AND TAXONOMY

On August 1, 2005, in response to the 80% decline in red knot population over the past ten years, leading conservation groups filed an emergency petition asking the U.S. Fish and Wildlife Service to list the red knot as an endangered species under the Endangered Species Act. The listing request comes from an alliance of wildlife groups, including Defenders of Wildlife, New Jersey Audubon Society, American Bird Conservancy, the National Audubon Society, Delaware Audubon Society, Citizens Campaign for the Environment, Audubon New York, Audubon Maryland-DC, and the Virginia Audubon Council.

Another indication of conservation concern for red knots is the fact that in August of 2004, the U.S. Shorebird Conservation Plan (USFWS 2004a) published its list of U.S. and Canadian shorebird

populations that are considered highly imperiled or of high conservation concern. The Canadian Arctic-Atlantic Coast Population of the red knot was one of eight taxa classified as “highly imperiled.”

Description

There are five (Morrison et al. 2004) or four (Harrington 2001) subspecies of the red knot currently recognized. Two of these (*Calidris canutus rufa* and *Calidris canutus roselaari*) are found in the United States but only during migration and in the winter. The red knot is characteristically found along the east coast of the United States, with the greatest population-staging on Delaware Bay (Tsipoura and Burger 1999) on its migration from its breeding ground in the Canadian Arctic to the Tierra del Fuego region of Chile and Argentina in South America. It is this subspecies that is the subject of the emergency petition.

Males in breeding plumage have a dark red or salmon breast, throat, and flanks, with a white belly. Their crown is flecked with gray and salmon, as is their back (Harrington 1996, 2001; Paulson 1993). Female coloration is similar to that of males, but is typically less intense. Nonbreeding plumage is a plain gray on the head and back, with light fringes of gray and white along the wings, giving an appearance of a white line running the length of the wing when in flight. The breast is white, mottled with gray; and the belly is dull white. For both male and female, the bill is black (year round), and the legs are dark gray to black (Harrington 1996, 2001). The average weight of the red knot is 5 ounces (which varies a lot through the year), with a body length between 9 to 10 inches.

Range and Migration

Red knots are found in the Arctic regions of Canada during the breeding season, which is mid-June through mid-August. They winter from November to mid-February, primarily in two separate areas in South America: Tierra del Fuego in Chile and Argentina, and in Maranhão, northern Brazil (Baker et al. 2005). Additional, smaller numbers of birds also winter further northwest in French Guiana and in the coastal, southeastern United States, including North Carolina, the Outer Banks, and the Cape Lookout National Seashore.

The Outer Banks of North Carolina serves as a critical link in the migratory path of several shorebird species. The red knot is present all year at Cape Lookout National Seashore but peak numbers are recorded during the spring migration in May and June (NPS 2006). Numbers of red knots in the seashore are lowest from January to March. In a 1992 and 1993 shorebird study of the Outer Banks, most red knots were seen around Ocracoke Inlet, North Core Banks (65% of total) and Ocracoke Island (28% of total) (Collazo et al. 1995).

Red knots have one of the longest migrations of any shorebird. Those individuals that overwinter in southern South America embark on their northern migration in February, with peak numbers leaving Argentina and southern Chile in mid-March to mid-April (Harrington 1996, 2001). The first stopover is along the coast of southern Brazil (Vooren and Chiaradia 1990). Their final stopover is the Delaware Bay. Their southward migration from the Canadian Arctic begins in mid-July. They arrive in South America along the coast of the Guianas in mid- to late-August (Spaans 1978). From the Guianas, red knots continue to move southward along the Atlantic coastline of South America, and the greater part of the population will continue on to Tierra del Fuego to overwinter (Morrison et al. 2004).

These long-distance migrations can only occur when the birds have access to productive refueling stops, particularly on their northern migrations, which involve fewer stops than the southern ones. For red knots on the eastern seaboard of the United States, Delaware Bay is the most crucial spring stopover because it is the final stop at which the birds can refuel in preparation for their nonstop leg to the Arctic. When they arrive at their final destination, weather conditions can be harsh, and food is scarce. Their fat reserves from the Delaware Bay must sustain them, not only during their 2,400-kilometer final flight, but also upon arrival in the Arctic until food resources become more plentiful (Baker et al. 2004).

Nonbreeding and Migratory Habitat

Harrington (1996, 2001) describes how, during the winter, the red knot frequents intertidal habitats, notably along ocean coasts and large bays. Both areas usually display high waves or strong currents, while supplying a sandy habitat. These areas are selectively chosen in South America, with the most abundant population on the island of Tierra del Fuego, in Argentina and Chile (Morrison and Ross 1989).

On migration, the red knot principally uses marine habitats in both North and South America. Coastal habitats along the mouths of bays and estuaries are preferred, providing sandy beaches to forage (Harrington 1996, 2001). High-wave-energy is associated with these areas (Harrington et al. 1986; Vooren and Chiaradia 1990; Blanco et al. 1992). Red knots are also known to use tidal flats in more sheltered bays or lagoons in search of benthic invertebrates or horseshoe crab eggs (Harrington et al. 1986; Harrington 1996, 2001; Tsipoura and Burger 1999). In some cases, beach habitats are preferred because of high densities of benthic bivalves (Harrington 1996). Red knots also use tidal flats in more sheltered bays or lagoons, where they hunt for benthic invertebrates (Harrington et al. 1986) or for special foods, such as horseshoe crab eggs (Harrington 1996; Tsipoura and Burger 1999). In Delaware Bay, their primary food are the eggs of horseshoe crabs (Tsipoura and Burger 1999; Baker et al. 2004). Delaware Bay hosts the largest number of spawning horseshoe crabs in the United States (Harrington 1996). Spawning season peaks in May and June, with peak spawning occurring on evening, high tides during the full and new moons. The birds' arrival in Delaware Bay coincides with the spawning of the horseshoe crabs, and the red knots now compete with the commercial harvest of horseshoe crabs. Until 1992, the harvest of horseshoe crabs was a traditional harvest to supply bait for a small eel fishery. But by 1996, millions of horseshoe crabs were harvested for use as bait for coast-wide conch and eel fisheries. This harvest is believed to be contributing to the red knot's failure to reach their needed threshold departure weight of 6.3 to 7.0 ounces. Hence, there has been a systematic reduction in the mass of red knots leaving Delaware Bay for the Arctic, which negatively impacts their ability to survive and breed (Baker et al. 2005).

Risks

Red knots are highly vulnerable to degradation of the resources on which they depend to accomplish their migrations (Myers et al. 1987). Morrison et al. (2004) have identified four factors that cause this vulnerability: (1) a tendency to concentrate in a limited number of locations during migration and on the wintering grounds, so that deleterious changes can affect a large proportion of the population at once; (2) a limited reproductive output, subject to vagaries of weather and predator cycles in the Arctic, which, in conjunction with a long lifespan, suggests slow recovery from population declines; (3) a migration schedule closely timed to seasonally abundant food resources, such as horseshoe crab eggs during spring migration in Delaware Bay (Tsipoura and Burger 1999), suggesting that there may be limited flexibility in migration routes or schedules; and (4) occupation and use of coastal wetland habitats that are affected by a wide variety of human activities and developments (Bildstein et al. 1991). The single, most important cause of the red knot's decline appears to be the acceleration of the harvesting of horseshoe crabs on the Delaware Bay that began in the 1990s.

Most disturbingly, research by Baker et al. (2004) indicates that if red knot populations continue to decline at their present rate, the bird would become extinct by, or near, 2010. New research by Niles et al. (2005) confirms that this extinction trajectory remains on track. The evidence strongly suggests that the decline of the red knot closely corresponds to the massive increase in the harvesting of the horseshoe crab on the Delaware Bay over the past decade.

Existing Protection Measures (Surveying and Management)

There is no federal protection status in the United States. The red knot has been identified in the *U.S. Shorebird Conservation Plan* as a species of "high concern" (USFWS 2004a).

OTHER WILDLIFE AND WILDLIFE HABITATS

In addition to the federally-listed threatened and endangered species and other protected species detailed in this assessment, a variety of other wildlife species depend on the habitats within Cape Lookout National Seashore. Although a large number and variety of species, including more than 400 species of birds, use the seashore at some point within their life cycle, only a small fraction have strong links to this interim protected species management plan/EA. This section describes the mammalian predators, such as raccoon; invertebrate species that inhabit the intertidal sand flats, wrack line, and moist substrate habitat; and other bird species that use the same habitat as the species identified for protection under this plan/EA.

MAMMALIAN PREDATOR SPECIES

The primary mammalian predators at Cape Lookout National Seashore are raccoons and feral cats; no foxes are known to occur on the islands at the present time. Raccoons are a serious threat to protected birds and a two-year predator study focusing on raccoons will begin in 2006.

INVERTEBRATES

Many of the protected bird species found within Cape Lookout National Seashore feed upon invertebrates. Some, like colonial waterbirds, feed over the open waters of the ocean, inlets, and sounds, capturing small fish, shrimp and other invertebrates. However, the piping plover, Wilson's plover, red knot, American oystercatcher, and the gull-billed tern (a colonial waterbird) feed on invertebrates in the beach zones that are subject to ORV use. The areas of concentrated foraging include moist sands of sand flats, island spits, and the intertidal zone, as well as the wrack line (drift line). The intertidal zone is defined as that part of the beach between the spring low water mark and the spring high water mark. The upper limits of the intertidal zone are defined by the upper-most wrack line. A wrack line is a line of stranded debris along a beach face marking the point of maximum run-up during a previous high tide and there may be several on a beach.

Invertebrates on sandy beaches can be classified into two groups, meiofauna and macrofauna. Meiofauna are interstitial species living and feeding among the sand grains and are an important part of the food chain. Meiofauna are less than 1.0 mm in size and are either juveniles of larger macrofauna or exist as meiofauna for their entire life history. On high-energy beaches of coarse sand, the meiofauna can extend deep into the sediment. However, in low-energy situations, such as sand flats with fine sand, oxygen is the major limiting factor and the meiofauna are concentrated in the surface layers of the sand (Stephenson 1999). Some common meiofauna include copepods, oligochaetes, and some polychaetes.

Macrofauna are invertebrates larger than 1.0 mm in size and are dominated by polychaetes, bivalves, and crustaceans (principally amphipods, decapods, and isopods). The distribution of macrofaunal invertebrates on individual beaches exhibits patchiness, zonation, and fluctuations related to tidal and other migrations (Stephenson 1999). Patchiness results from passive sorting by waves and swash (part of the intertidal zone which is periodically covered by water in response to tide excursions and wave run-up), from localized food availability, variations in the penetrability of the sand, and from species actively aggregating (Stephenson 1999). Zonation across a beach results from exposure, changing wave energy levels and sand water content and stability (Stephenson 1999). Exposed sandy beaches are typically dominated by crustaceans, while polychaetes become increasingly dominant with decreasing exposure and dominate in very protected areas (Stephenson 1999). Rupert and Fox (1988) found that high-energy intertidal beaches; in the southeastern United States may have as many as 20 – 30 invertebrate species, while within the boundaries of Cape Lookout National Seashore, Wolcott and Wolcott (1984) studied the impacts of ORVs on the three major macroinvertebrates inhabiting mid-Atlantic beaches; the mole crab (*Emerita talpoida*), coquina clam (*Donax variabilis*), and ghost crab (*Ocypode quadrata*).

Invertebrates are also found within the wrack line. Wrack lines are composed of drying seaweed, tidal marsh plant debris, decaying marine animals, shells, and miscellaneous debris washed up and deposited on the beach. The wrack line provides a cooler, moist habitat suitable for many invertebrates such as amphipods, beetles, mites, worms, flies, and spiders.

The sand flats, intertidal zone, and wrack line are extremely dynamic and harsh environments, often changing over short periods of time. The various invertebrates that inhabit these areas have evolved a variety of adaptations for dealing with their ever-changing environment. Some burrow into the sand to escape the elements, while others migrate back and forth between the beach grass and the wrack, while still others migrate back and forth with the swash. However, the dynamics of the fauna on sandy beaches have never been completely investigated (Steinback in-prep).

OTHER BIRD SPECIES

Nearly 400 species of birds have been sighted within Cape Lookout National Seashore and its surrounding waters (USGS 2005). This impressive number is due to several factors: a location on the Eastern Flyway, varied habitats, and strong winds and storms that often bring exhausted vagrants to the seashore. Some of these birds can be seen year round. Many spend only summer or winter seasons at the seashore. Thousands of shorebirds pass by during spring and fall migrations between North and South America. The seashore has recently been designated a Globally Important Bird Area by the American Bird Conservancy because of the importance of the seashore habitats to bird breeding, migration, and wintering (Watson 2003).

Coastal dunes and barrier island ecosystems are major features at Cape Lookout National Seashore. Large numbers of migratory and nesting bird species are found on barrier islands (Stalter and Odum 1993 as cited in NPS 2006). Coastal marshes are critical to overwintering populations of many waterbirds. In addition, migration routes of many raptor species include southeastern barrier islands. Neotropical migrants use the islands as a point of departure and arrival in their travels to and from their winter habitats in the tropics (Stalter and Odum 1993 as cited in NPS 2006).

Studies documenting the seasonal abundance, distribution, and relative importance of shoreline habitats to shorebirds on the Outer Banks of North Carolina recorded 21 species of shorebirds. The most abundant were sanderling, red knot, and willet. As an assemblage, shorebirds were most abundant in May and August. Peak numbers for each species were recorded between April-May and July-September. Shorebird abundance was greater during fall (68 birds/km) than in spring (50 birds/km). American oystercatchers and whimbrels were significantly more abundant during spring than fall, whereas willet and sanderlings were more abundant during fall. The Outer Banks emerged as an important staging area for the Atlantic populations of piping plovers, whimbrels, and sanderlings when compared to seven other areas along the eastern coast of the U.S. The importance of the area to sanderlings was reaffirmed by return rates of 58%; most returned to the beach stretch where they were banded (Dinsmore et al. 1998). Findings from the 1998 study confirm that the Outer Banks of North Carolina provide a critical link in the migratory path of several shorebird species.

Migratory birds are also often found throughout the seasons on the way to and from their destination. During the winter months, the common loon, pied-billed grebe, northern gannet, tundra swan, as well as Canadian geese are common sights at the seashore. For the summer migratory season, several varieties of herons, Audubon's shearwater, and the barn swallow populate the seashore. While less frequently sighted, several additional species of shearwaters, grebes, herons, ducks, geese, hawks, eagles, including bald eagles, falcons, sandpipers, and gulls also inhabit the islands at one point or another throughout the year. Rarely, birds like the tropical masked booby and the magnificent frigate bird can also be spotted.

VISITOR USE AND EXPERIENCE

Cape Lookout National Seashore is located in the central coastal area of North Carolina. The nearest sizeable cities from seashore headquarters on Harkers Island are Greenville (92 miles, population 61,000); Goldsboro (110 miles, population 39,000); Wilmington (115 miles, population 92,000), New Bern (38 miles, population 23,128) and Jacksonville (47 miles, population 66,715). The nearest metropolitan areas are Charlotte (327 miles, population 541,000); Raleigh/Durham/Chapel Hill (160 miles, population 1.13 million); and Washington, D.C. (380 miles, population 5 million). Local communities closest to the seashore include Atlantic Beach, Morehead City, Beaufort, and many small towns along the mainland, including Davis and Atlantic, which are the mainland terminals for the vehicle/passenger ferries to the islands. There has been no detailed formal visitor use survey conducted at Cape Lookout National Seashore to date, although one is planned as part of the implementation of this plan/EA. Based on staff observations, most of the visitors to the seashore originate from the North Carolina region, including the metropolitan areas such as Charlotte and Raleigh/Durham.

ANNUAL VISITOR USE

Visitation at Cape Lookout National Seashore has grown rapidly over the years. In a 29-year span between 1976 and 2004, recreational visitation at the seashore rose from 21,000 to 720,216. Over the past 5 years, visitation grew from 553,242 to 720,216, a 30% increase. NPS attributes a large percentage of the increase to day-use activities in the Cape Lookout Keepers' Quarters area (NPS 2001b), as well as the increase in the number of companies providing ferry services to the island, including increases in numbers of daily trips and in numbers of visitors accommodated per trip (NPS 2004b). Recreational visits declined slightly in 5 of the years since 1988, but the general growth trend has persisted since that time. Visitor use reports for 2005 indicate that through November, 623,843 visitors went to the seashore to pursue various types of recreation (Ketel 2005).

VISITOR DISTRIBUTION

Monthly visitor use documented from 1979 through the present shows that, while the seashore is open year round, the highest visitor use occurs between April and November. The summer months of June, July, and August generally show the highest recreational use, with visitation in recent years often reaching over 100,000 in either July or August. Visitation also reaches higher numbers in October and November, during the main fishing season. The winter months of December, January, and February generally have the lowest visitation. Based on staff observations, the typical annual peak days are the weekends of Memorial Day, 4th of July, and Labor Day. This use pattern is expected on holiday weekends at a water-based park like Cape Lookout National Seashore that is within easy access of cities and metropolitan areas.

Based on ranger patrol records and seashore staff observations, the most active recreation occurs on or in the waters surrounding Shackleford Banks and South Core Banks, with North Core Banks and Middle Core Banks receiving fewer visitors. However, those using ORVs to access fishing or camping areas tend to distribute themselves relatively evenly over the islands beaches, with no particular areas of high use (Ketel 2005). The majority of visitors are day visitors, although many visitors take advantage of the on-island cabin accommodations at Great Island and Long Point, or camp along the beach for several days. Concessionaire lodging information shows that, although general seashore visitation is highest in the summer months, use of the cabin facilities is actually higher in the fall months of October and/or November, during the peak fishing season. Backcountry camping follows a similar pattern, with highest numbers of overnight visits in the summer months and the fall fishing months. Hurricanes, of course, can greatly affect seasonal use patterns. Table 15 provides monthly recreational visitor use statistics for the entire seashore, concessionaire lodging, and backcountry camping for the year 2004, which is relatively representative of other recent years.

TABLE 15: MONTHLY RECREATIONAL VISITS, CONCESSIONAIRE LODGING, AND BACKCOUNTRY CAMPING

Month	Recreational Visits	Concessionaire Lodging	Backcountry Camping*
January	19,883	0	0
February	33,414	0	9
March	25,398	0	95
April	30,996	2,149	851
May	78,493	2,526	1,161
June	91,435	2,264	5,471
July	111,403	1,883	872
August	82,722	807	468
September	72,845	2,927	945
October	86,284	5,415	2,296
November	59,058	2,413	822
December	28,685	435	210
TOTAL	720,216	20,819	13,200

Source: National Park Service; * Overnight Visits

RECREATIONAL OPPORTUNITIES AND USE AT CAPE LOOKOUT NATIONAL SEASHORE

The seashore is relatively undeveloped and has no maintained roads, and no road or bridge connects the islands to the mainland or to each other. Therefore, visitors participate in recreational activities at the seashore either as part of a day trip to the seashore via passenger ferry or private boat, or by transporting their own vehicle to the islands by vehicle/passenger ferry and staying at the cabins or camping at other areas along the beach. A diverse range of recreational opportunities are available at the seashore including fishing (surf and boat), beach driving and ORV use, motorized boating, non-motorized boating (sailing, kayaking, canoeing), camping, historical tourism, nature/eco studies (birding, horse watching), photography, hunting, beachcombing and shelling, hiking, swimming, and other beach-based recreation. Thousands of visitors cross the sound annually to just walk the beaches or view the Cape Lookout lighthouse and associated historic buildings. The popularity of the Core Banks as a surf fishing destination precedes the establishment of the national seashore. Hundreds of fishing enthusiasts return each year to fish the more than 50 miles of uninterrupted shorelines, especially during the spring and fall months.

Many of these popular visitor activities occur in areas that are sensitive because of the presence of protected species, especially the shorebirds that nest along the dunes and on the beach, and the sea turtles that must cross these same beaches to lay their eggs. The following provides a description of facilities, accommodations, and access available at the seashore, followed by a description of the primary recreational activities that may affect or be affected by the implementation of this plan/EA.

SEASHORE FACILITIES

The major facilities at Cape Lookout National Seashore include the visitor center and seashore headquarters (located across from the main portion of the seashore on the east end of Harkers Island); the Cape Lookout Lighthouse and Keepers' Quarters (on the south end of South Core Banks, near Cape Lookout National Seashore); Portsmouth Village (a historic village at the very north end of the seashore); and the Long Point and Great Island cabins (operated by a concessionaire).

The seashore and major visitor use areas in the “Purpose of and Need for Action” chapter depicts these locations and their associated facilities. Much of the day use visitation focuses around the lighthouse complex, which includes a seasonal visitor contact station and museum in the Keepers’ Quarters, picnic shelter, restrooms, a parking area (used mainly for short-term parking), and the lighthouse itself. The remainder of the seashore is undeveloped, with only a few scattered picnic areas and composting toilets.

CABINS

The concessionaire-run cabins at Long Point and Great Island are the only accommodations on the islands; there are no developed campgrounds. The guests at the cabins generally bring their vehicles with them for island access.

The Long Point cabins (currently operated by the Morris Marina concessionaire) are on the southern end of North Core banks, near the Long Point ferry landing. They consist of 6 new duplexes containing 12 units, built in 1995 by the NPS, plus 4 octagonal buildings constructed in the mid-1980s. Additional facilities constructed over the years include comfort stations, picnic shelters, a public shower/restroom facility, a dump station, and a gas pump. One parking area that accommodates approximately 60 vehicles is located adjacent to the cabin area and is full most of the year. Fishermen often leave their vehicles or campers on the island from April to December.

The Great Island cabins (currently operated under a temporary emergency contract by the Morris Marina concessionaire) are located on the northern third of South Core Banks adjacent to the Great Island ferry landing. The camp consists of 25 cabins most of which have been recently rebuilt after Hurricane Isabel in 2003.. Similar to Long Point, the cabin area includes picnic facilities, a public restroom/shower facility, a dump station, and a gas pump. One parking area accommodating approximately 100 vehicles is located adjacent to the cabin area and is full for most of the summer.

Summer occupancy of cabins rose nearly 25% from 1998-2001 at the Long Point location, while the numbers at Great Island were more constant during that period (NPS 2001b). The increase in occupancy at Long Point may be attributed to the upgraded facilities, which may appeal to a wider variety of seashore visitors. Table 16 summarizes the numbers of visitors staying at both cabin locations for the past 10 years. Overall, cabin occupancy has been relatively steady over this period, generally in the range of 20,000 to 25,000 per year. The lower figure for 2003 is due to the effects of Hurricane Isabel; the cabins were closed from the mid-September through mid-November of that year.

TABLE 16: CONCESSIONAIRE LODGING – 1995 TO 2004

Year	Overnight Lodging Visits
1995	16,579
1996	21,983
1997	24,395
1998	25,994
1999	22,586
2000	26,108
2001	15,502
2002	24,671
2003	12,015
2004	20,819

Source: NPS

ISLAND ACCESS (BOATS AND FERRY SERVICE)

Private Boats. Many day users use private motorboats to reach the national seashore. There are no public boat launches or boat slips within the national seashore; however, several public launches are on the mainland near the islands. The soundside sandy beaches and inlet areas, encompassing about 5 to 6 miles of the 56 miles of sound shore, provide the predominant access for private boat owners, who anchor their boats offshore. Cape Lookout National Seashore patrol logs maintained in 2000 and 2001 show that 6,140 to 6,880 boats were observed accessing the islands on the soundside and up to 523 boats were counted in one day (NPS 2004b).

Access is also possible using non motorized boats such as kayaks, sailboats, and canoes. Not all of these trips result in island access; many visitors remain in the shallow waters surrounding the islands, taking advantage of various paddling opportunities.

Passenger Ferries. Passenger ferries operated by permittees and concessionaires are the predominant method of island access for visitors without vehicles or private boats. Authorized ferry services are provided from Ocracoke to Portsmouth Village; from Harkers Island and Beaufort to the Cape Lookout Lighthouse area and Shackleford Banks; and from Morehead City to Shackleford Banks. Table 17 lists all authorized services (including the vehicle/passenger ferry operators) that operate from April to November. (Some ferries will operate in the winter if a party contains a minimum number of people.) Passengers debark on the beaches or at the public docks, and are then picked up at a later, pre-arranged time. Some ferry operators allow the transport of pets.

One of the most popular passenger ferry routes is to the Cape Lookout National Seashore lighthouse complex. Statistics maintained on annual ferry arrivals at the lighthouse area since 1999 are shown in table 18.

TABLE 17: AUTHORIZED FERRY SERVICES

Destination	Point of Embarkment	Operator Name	Type	Pets Allowed?
North Core Banks – Portsmouth Village	Ocracoke	Rudy Austin	Passenger only	Maybe – call first
North Core Banks – Long Point	Atlantic	Morris Marina Kabin Kamps and Ferry Service	Vehicle and Passenger	On leash or in vehicle
South Core Banks – Great Island	Davis	Great Island Cabins and Ferry Service	Vehicle and Passenger	In vehicle or crate
South Core Banks – Cape Lookout Lighthouse and Shackleford Banks	Harkers Island	Calico Jacks Ferry	Passenger	On leash
		Harkers Island Fishing Service	Passenger	On leash
		Local Yokel Ferry and Tours	Passenger	Maybe – call first
South Core Banks – Cape Lookout Lighthouse and Shackleford Banks	Beaufort	Island Ferry Adventures	Passenger	On leash – call first
		Mystery Tours	Passenger	On leash
		Outer Banks Ferry Service	Passenger	On leash
Shackleford Banks	Morehead City	Waterfront Ferry Service	Passenger	Maybe – call first

Source: NPS

Vehicle / Passenger Ferries. Vehicle /passenger ferries travel from the mainland to the Great Island ferry landing on South Core Banks and the Long Point ferry landing on North Core Banks. Most of the ferry passengers are overnight visitors who occupy cabins, camp in their own recreational vehicle, or camp in tents.

Table 19 provides data and the numbers of vehicles using the ferries at both Long Point and Great Island for the past 4 years. The reduced numbers for 2003 reflect the effects of Hurricane Isabel.

TABLE 18: LIGHTHOUSE AREA PASSENGER FERRY ARRIVALS

Year	Number of Arriving Passengers
1999	26,416
2000	39,095
2001	44,718
2002	45,058
2003	43,551
2004	40,476

Source: NPS; arrivals at Keepers Quarters

TABLE 19: VEHICLE DATA – LONG POINT AND GREAT ISLAND VEHICLE/PASSENGER FERRIES AND VEHICLE DAYS, 2000-2004

Year	Long Point Vehicles ¹	Total Vehicle Days ²	Comments
2000	2,174	9,207	-
2001	2,000	18,003	-
2002	1,992	15,308	Missing June data
2003	997	6,392	Isabel Closure 9/15 to 10/30; Missing Nov. data after Isabel
2004	1,794	5,648	Missing July data; end date may be in error
Average	1,791	10,912	-
Year	Great Island	Total Vehicle Days ²	Comments
2000	2,722	38,007	Missing May, June, July data
2001	2,883	41,384	-
2002	2,622	28,539	Possible late start date March or April
2003	1,480	23,325	Isabel Closure 9/15 to 10/30; Missing Nov. data after Isabel
2004	2,566	36,472	Missing June, July data
Average	2,455	33,545	-

Source: NPS

1. The total number of vehicles that arrived by ferry during the year at Long Point and Great Island.

2. The number of vehicles on the island each day totaled for the 10-month visitor use season. The seashore is closed in January and February; there is no ferry access to the islands from mid-December to mid-March.

OFF-ROAD VEHICLE USE AND ACCESS

The term “ORV” in this document refers to any vehicle used to access various parts of the islands, either by driving along the 45 miles of beach or on the 30 miles of interior sand roads on North Core Banks and South Core Banks. These include 4-wheel drive passenger vehicles, sports utility vehicles (SUVs), two-wheel drive recreational vehicles, a variety of two-wheel and four-wheel drive pick-up and other larger trucks, trailers, all terrain vehicles (ATVs), and utility vehicles. There are no data relating to the proportion of different types of vehicles brought onto the island.

ORVs are currently used to provide vehicular access onto Cape Lookout National Seashore beaches for recreational purposes, including surf fishing, camping, surfboarding, sunbathing, swimming, bird watching, scenic driving, etc. ORV use at the seashore is seasonal. Vehicle ferries cease operation from mid-December through late-March. Island vehicle parking/storage lots close from January 1 until mid-March or April when ferry services resume. ORV use is concentrated during September, October, and November. Highway vehicles are brought to the islands via vehicle ferries whereas ATVs may be brought via ferries or by private boat. Some private boats carry ATVs that boaters use on the islands once the boat is moored. Probably the primary use of ORVs at the seashore is for transport to desired fishing and camping locations along the long stretches of beaches. Fishermen use ORVs to find ever changing fishing “holes,” to pursue migrating schools of fish, and to reach more productive areas such as Cape Point or the inlets. Since these areas, as well as the entire beach, are habitat for the protected shorebird and sea turtle species that are the subject of this plan/EA, there is a potential for conflict between necessary closures and ORV use. Because productive fishing areas may change daily with the tides, the impact of closures may be greater than simply the number of fishermen or area affected; if the fishermen cannot get to the right spot they will be unsuccessful.

Off-Road Vehicle Use Data

Table 19 above provides numbers of ORVs transported to the islands by the ferry services at Long Point and Great Island from 2000 to 2004. At Long Point, the number of ORVs transported to the island annually has ranged from a low of 997 (during 2003, when Hurricane Isabel hit) to 2,174 with an average 1,791 vehicles for all 4 years. At Great Island, annual ORVs transported to the island ranged from 1,480 in 2003 to 2,883 in 2001, with an annual average of 2,455 vehicles.

Table 19 also provides the total vehicle days for each location. This is an annual cumulative total of the vehicles on the island each day. This number is much larger than the number of vehicles that are transported to the islands because each vehicle that arrives may spend multiple days on the island. For example, 15 vehicle days may represent 1 ORV that is on the island for 15 days, or it may represent 15 different ORVs on the island for 1 day each, or any other combination of vehicles and days. Numerous ORVs remain on the islands for more than one day and are either in use or parked in a long-term parking lot. Some visitors bring their vehicles to the islands and leave them parked for an indefinite period, returning periodically throughout the spring, fall, and summer. Approximately 2 to 3 times more annual vehicle days occur at Great Island than at Long Point because of the greater number of long-term parking spaces available at Great Island and because visitors tend to stay longer on South Core Banks.

The NPS uses vehicle days to estimate the number of vehicles on South Core and North Core Banks daily. The number of vehicles that arrive each day on the ferry at Great Island and Long Point is added to the vehicles that are currently on each island. Likewise, the number of vehicles that depart each day is subtracted from the daily vehicle total. For example, if 8 ORVs arrive on Great Island via the ferry in early-March, 8 is added to the 0 that are currently on the island resulting in 8 vehicle days. The next day when 19 ORVs arrive, 19 is added to the previous 8 resulting in 27 total vehicle days. The following day

when 10 vehicles arrive and 4 depart, 33 total vehicle days result ($10 - 4 = 6$ net vehicles). At the end of each month and for the year, a cumulative number of vehicle days is available by adding and subtracting the daily arrival and departure of vehicles.

Based on this data, approximately 3,600 to 4,000 vehicle days occurred monthly on South Core Banks during the 2004 summer months, while approximately 200 to 650 vehicle days occurred monthly on North Core Banks during the same period. Vehicle days were much higher during the fall fishing season on South Core Banks at Great Island, particularly during October 2004 when 8,036 vehicle days occurred. Monthly vehicle days at Long Point during the fall are also higher than in summer months. For example, in October 2004, approximately 1,200 vehicle days were counted. On a daily basis, approximately 130 to 258 vehicles per day may be found on South Core Banks depending upon the season. Daily totals on North Core banks are less, ranging from a few to approximately 40 vehicles per day during high-use periods. Again, not all these vehicles are being used on all days; many are likely in long-term parking. Additionally, data is not available that indicates the numbers of ORVs using certain areas of the beach or island.

In addition to personal ORVs brought onto the island by visitors, ORVs are also used by concessionaires to provide a limited island shuttle or “taxi” service from both the Long Point and Great Island areas. Passengers contract with the concessionaire for vehicle transport to various places on the island on a per mile rate basis. A more popular shuttle service, operated by Incidental Business Permittees, is available at the lighthouse complex, where ORVs and trailers are used to transport ferry passengers to and from Cape Point.

ORV Use Areas

ORVs can be used only on the oceanside beach (below the primary dune line) and on designated marked routes, including the interior sand road, crossover ramps, vehicle parking/storage areas, cabin camp areas, and sound access routes, on both North Core Banks and South Core Banks. Public vehicle use is not permitted on Shackleford Banks because it is a proposed wilderness area. The interior road generally parallels the center of the islands and is connected to several other designated routes. ORVs access the beach through a system of ramps that connect the interior sand road with the beach. Mile signs mark the beach in 1-mile increments along the ocean dune line, starting at Ocracoke Inlet, and the ramps are numbered as possible to coincide with these mile markers. Figure 16 depicts the approved public ORV routes on the islands, including the beach ramps. All approved routes are marked with “jeep” signs and ramps are marked with “ramp” signs. Currently, because of the opening of Old Drum Inlet and the creation of a new inlet approximately three-fourths of a mile south of New Drum Inlet by Hurricane Ophelia, ORVs cannot access the New Drum Inlet area.

ORV Regulations

A number of areas throughout the seashore are closed to ORV travel on a permanent basis, either due to safety issues or for visitor use or resource protection purposes. Temporary or seasonal closures to ORVs also occur to protect sea turtles and bird species such as piping plovers, American oystercatchers, and colonial waterbirds along the beaches and inlets. Restrictions on ORV use, as outlined in the Superintendent’s Compendium, include the closures and rules listed below.

The following areas are closed to all public vehicular traffic:

- Portsmouth Village Historic District on North Core Banks
- Cape Lookout Light Station on South Core Banks
- Property of retained rights (leases and lifetime estates), unless invited by the legal tenant of the lease or estate

- Employee housing and maintenance areas on Harkers Island
- The beach on the oceanside of the seashore is closed year-round , between the following points:
 - Ramp 41A to ramp 42A (this is an area in front of the lighthouse, reserved for non-vehicle beach use)
 - Power Squadron Spit from Mile 46.1 (rock jetty area) to the tip of the spit (this area contains sensitive bird habitat and is reserved for non-vehicle use)
- All soundside beaches on North Core Banks, Middle Core Banks, and South Core Banks
- All of Shackleford Banks (this is a proposed wilderness area)
- Any beach route posted as “closed” by the NPS
- Roads posted as “Authorized Vehicles Only”

The following activities are prohibited:

- Loading or unloading vehicles from or onto a concession dock or within a concession assigned area, except as other wise authorized
- Operating any vehicle, including an ATV, without a valid state driver’s license in possession, and by anyone under the age of 16
- Allowing any person not possessing a driver’s license to operate a motor vehicle
- Driving a vehicle in a manner that needlessly ruts the sand
- Operating a motor vehicle with less than 3 wheels (includes motorcycles or tracked 2-wheel vehicles)
- Operating any vehicle on Shackleford Banks
- Failing to fill to the original level any hole caused by excavating a vehicle from the sand
- Vehicle / recreational vehicle camping on the backroad except in designated sites
- Delivery of vehicles to the banks, except for authorized ferry concessionaires

The maximum speed limit is 25 miles per hour either on the beach or the interior road, except within 100 feet of pedestrians, where speeds must be reduced to 15 miles per hour. Any vehicles left unattended for over 24 hours must be parked in an official parking area and have a valid vehicle permit.

Off-Road Vehicle Closures

ORVs are allowed to drive along the ocean shoreline throughout Cape Lookout National Seashore, except in areas that are closed permanently, temporarily, or seasonally to protect sea turtles and shorebirds such as piping plovers, American oystercatchers, and colonial waterbirds during critical periods during their life history. Closures to protect bird nesting areas are marked with posts and signs and prohibit any unauthorized vehicles, pedestrians, or pets. Sections of beach closed because of turtle nesting prohibit unauthorized vehicle entry. As noted above, some of the permanent closures within the seashore that

occur because of sensitive bird habitat include Portsmouth Flats on North Core Banks and Power Squadron Spit on South Core Banks. The interior of Cape Lookout Point is also closed due to bird nesting activities.

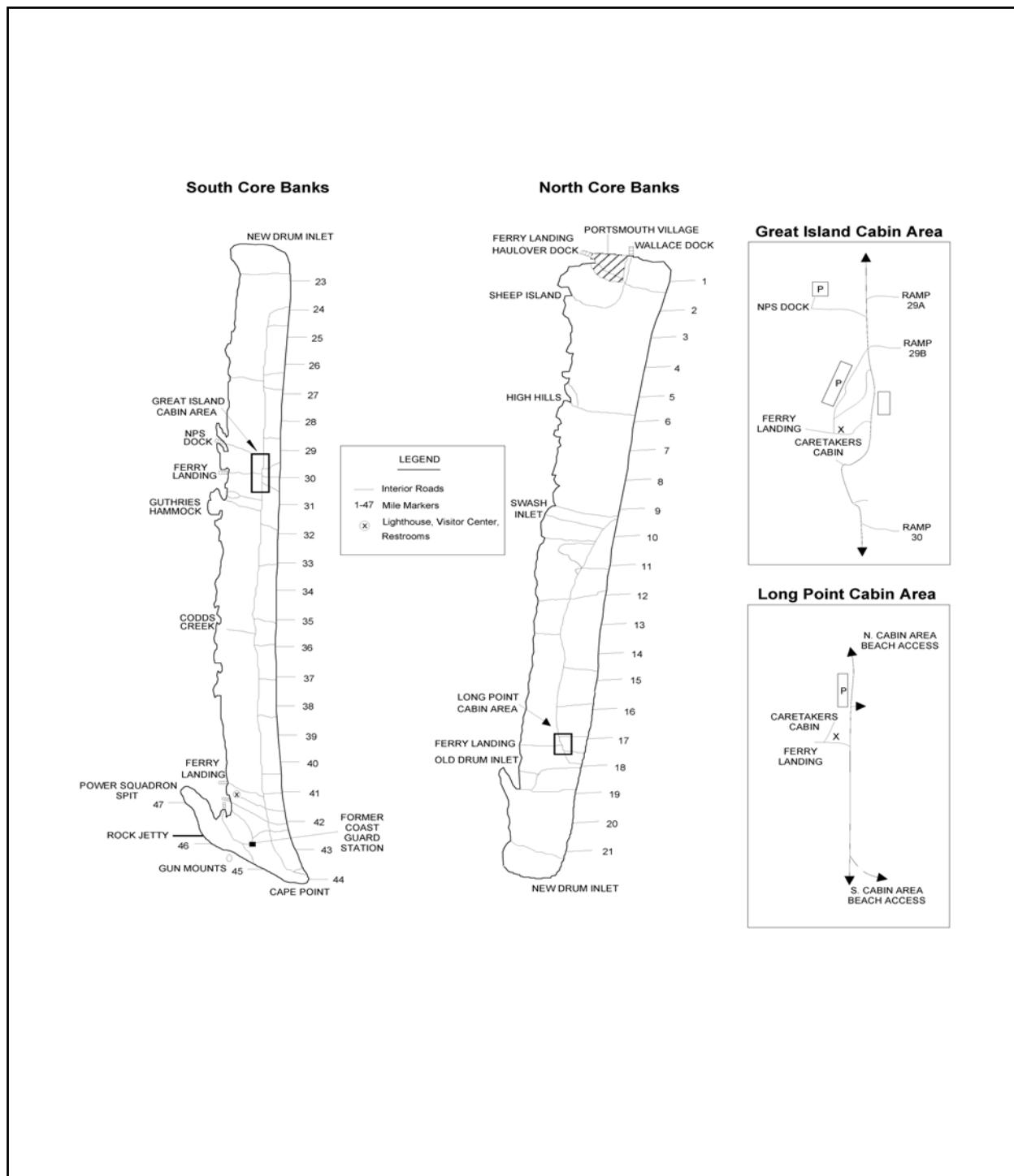


FIGURE 16: OFF-ROAD VEHICLE ROUTES

The areas subject to closures that have the most potential for conflict with ORV users are areas near the inlets, particularly Old and New Drum inlets, and the area around Cape Point. These are prime fishing areas and popular spots for boat access and hikers, photographers, etc., but also provide important or critical habitat for nesting plovers and other protected species. Recent closures are described below.

American oystercatchers. American oystercatcher nests are not concentrated in small areas like colonial nesters but are scattered along the entire 56-mile length of ocean beach within the seashore. Beginning in 2005, the beach between the ocean water line and the dune line was closed to ORVs in the vicinity of successfully hatched American oystercatcher nests throughout the seashore. ORVs operating near these nests were routed to the internal or backroad via designated ramps. In areas without a backroad system, ORV traffic was allowed on the beach at 15 mph with signs warning operators about flightless chicks in the area. These areas were reopened to ORV traffic after the chicks fledged (i.e., the chicks were capable of sustained flight) or were lost (NPS 2005a).

Piping plover. All known piping plover nesting areas are posted by April 1 each year. These areas include Ocracoke Inlet, Portsmouth Flats, Kathryn-Jane Flats, Old Drum Inlet, New Drum Inlet on North Core Banks, New Drum Inlet on South Core Banks, Plover Inlet (Mile 23.6), Cape Point, Power Squadron Spit, and Shackleford Banks. Nesting areas are closed to entry by pedestrians, ORVs and pets, using the seashore's standard "Bird Sanctuary" signs mounted on wood posts. ORV traffic is allowed in a corridor along the shoreline on the ocean beach, as long as at least a 50-meter or 150-foot buffer from active nests is maintained. If a piping plover chick is found using the ocean beach that area will immediately be closed to ORVs using "no vehicle" signs and educational signs explaining the purpose of the closure. The closure remains in effect until the chicks move to a different location or are fledged. Twice daily escort programs have been used at Kathryn-Jane flats to allow ORV access to the northern half of North Core Banks and Portsmouth Village (NPS 2005b).

In 2005, the ocean beach corridor along the nesting area near New Drum Inlet on South Core Banks was closed when the first nest in that area hatched. The concentration of nests, narrowness of the island at that point, and inability to survey broods around the clock led to this closure (NPS 2005b).

Sea turtles. Temporary closures to ORVs and pedestrians are implemented during nesting and hatching activities for all sea turtle species that are known to nest at Cape Lookout National Seashore. Generally, ORVs and pedestrians can negotiate around these posted closures. However, when the turtle eggs are ready to hatch, the NPS implements a beach closure with fencing from the nest to the water's edge. If sufficient room exists, ORVs and pedestrians can go around the landward side of the fence. In some cases, the beach must be closed from the dune line to the ocean because the location of a nest relative to a dune or vegetation prevents ORV and pedestrian access through the area.

Three nest relocation areas, up to 1 mile in length, are designated on each of North Core Banks and South Core Banks. These are located in between mile markers 5 and 6; 11 and 12; 16 and 17; 26 and 27; 35 and 36; and 42.5 and 43.5. These nest relocation areas are closed to ORV traffic beginning 50 days after the first nest is relocated to the area. The nest relocation area is reopened to ORV traffic after the last nest within it is excavated.

FISHING

Spring and fall at the seashore offer what many consider to be some of the best fishing on the Atlantic coast. There are no fishing piers or boat slips, but surf fishing along the beaches is extremely popular. Hundreds of fishing enthusiasts return each year, and fishing tournaments are held in the spring and fall, drawing 50 to 100 participants at one time (Ketel 2005).

Fishermen are one of the predominant users of ORVs on the islands, especially during the fall months. They rely on ORVs to access their favorite fishing spots, locate ever changing fishing "holes," and follow

migrating fish along the length of the Core Banks in their own vehicles, staying in their vehicles and tents (camping) or in cabins at Great Island and Long Point. Areas near the inlets and Cape Point are popular fishing spots, but are also areas of high concentrations of protected shorebirds.

Others fish from boats moored along the soundside of the seashore, and areas near the inlets are known to be popular fishing spots.

CAMPING

Backcountry camping is also popular at the seashore. There are no designated campgrounds in the seashore; however, camping is allowed anywhere on Shackleford Banks and Core Banks, with the following exceptions:

- within 100 yards of a well, shade shelter, bulletin board, dock, or other structure
- within 100 yards of any cabin, house, or the lighthouse
- in concession cabin areas
- Portsmouth Village Historic District
- Cape Lookout Light Station Complex
- Cape Lookout Village
- areas of private rights (leases and life estates)
- Harkers Island Administrative Site
- turtle and bird closure areas
- designated parking areas
- directly on top of dunes, so as to disturb vegetation
- trailers must camp only seaward of the primary dune line or in an area marked with camping signs

Camping is limited to 14 consecutive days, and campers are asked to obtain a backcountry camping permit for all camping on the islands. Camping visitation is generally concentrated at the west end of Shackleford Banks, but is dispersed along the Core Banks.

Table 20 summarizes the number of backcountry campers (overnight visits) by year since 1995. Over this 10-year period, annual backcountry camping has ranged from a low of 6,386 in 1996 to a high of 13,200 in 2004, with effects from Hurricane Isabel apparent in 2003. Since 1997, the national seashore had an annual average of 8,800 overnight backcountry stays (NPS 2004b).

Campers are permitted to bring dogs to the islands, if allowed by the ferry service, but dogs must be on a leash at all times. The high percentage of visitors that do not comply with the dog leash regulation may be one of the most significant resource protection concerns.

Campers must also be responsible for carrying out all trash, as Cape Lookout National Seashore is a trash-free seashore and does not provide trash cans or garbage pickup on the islands. Other than fish remains from cleaning fish and the cabin camps, the seashore does not have a significant problem with trash left on the island by visitors.

On the North Core Banks and South Core Banks, most camping is vehicle based, although boat-based camping does occur on beaches near the spits, near the lighthouse, and particularly on the west end of Shackleford Banks. Most campers transport ORVs or vehicle campers to the island via the ferry services

and stay on the islands for periods ranging from a few days to several weeks. Campers staying next to or hiking near bird closure areas can be an issue because of the noise and physical presence of humans and dogs near those areas and the potential for improper disposal of garbage.

TABLE 20: BACKCOUNTRY CAMPERS – 1995 TO 2004

Year	Number of Backcountry Campers
1995	8,395
1996	6,386
1997	6,753
1998	7,598
1999	8,989
2000	8,988
2001	11,190
2002	9,007
2003	6,799
2004	13,200

Source: NPS

HIKING

There are few trails on the seashore, but many visitors do backpack or hike the islands, especially from their home-base camp sites. All dogs must be kept on a leash at all times.

OTHER SHORELINE USE

Other day use activities popular on the islands include walking, shelling, birding, photography, picnicking, horse watching (on Shackleford Banks), swimming, and touring the lighthouse complex area. Most of these visitors are seeking a remote beach experience away from the typical beach or hotel resort experience available along other areas of the Carolina coast. These users are limited to the areas they can visit by their own mobility; most arrive by passenger ferry and some by private boat.

The most highly visited day-use area is the lighthouse complex, which draws visitors to the historic sites as well as the surrounding beaches and scenery. Many private boats anchor in this area, and the passenger ferries transport approximately 26,000 to 45,000 people each year. Many visitors spend their day touring the lighthouse area, the Keepers' Quarters, and the Coast Guard station, but many also walk or take the ORV shuttle to the surrounding beaches and spits, if accessible.

Areas of most potential conflict between shoreline users and protected species management include areas around the popular inlets and Cape Point. Boaters like to anchor and access the island on the soundside, especially near Old Drum Inlet and the south end of Middle Core Banks. They then cross over to the oceanside for various activities, and this can mean crossing near protected species habitat or potentially through closure areas. Likewise, closures at inlets have a high potential to impact beach access by significantly increasing the walking distance from a sound side boat anchorage to the ocean beach.

SOCIOECONOMICS

This section describes the social and economic environment that would be potentially affected by the proposed alternatives. The social and economic environment of a region is characterized by its demographic composition, the structure and size of its economy, and the types and levels of public services available to its citizens.

The socioeconomic environment evaluated for this plan/EA encompasses one county in coastal North Carolina—Carteret. This county forms the economic region of influence (ROI) and defines the geographic area in which the predominant social and economic impacts from the proposed action are likely to take place.

POPULATION

Carteret County, comprising the economic ROI, varies in character, with Morehead City having a population of over 7,000 and Indian Beach home to only 192. Much of Carteret County's population resides in the mainland cities of Beaufort, Newport, and Morehead. The county is home to an important coastal tourism destination known as the Crystal Coast area—this area includes the populated areas of Atlantic Beach, Beaufort, Down East communities, Emerald Isle, Indian Beach, Morehead City, and Pine Knoll Shores.

Demographic and economic trends over the last three decades show a steady pace of growth. With a population of 62,034 as of 2004, Carteret County is the 41st largest out of 100 counties in North Carolina, and it ranks 809 out of 3,141 counties and county equivalents (boroughs and parishes) in the nation. As shown in table 21, the population of Carteret County increased from 31,603 in 1970 to 59,383 in 2000—the county's population nearly doubled with an increase of 27,780 people in 30 years. Since 2000, the Carteret County population has continued to increase. Population data for all of North Carolina and the United States are also provided in table 21 for comparison purposes.

Recent demographic forecasts by the North Carolina State Demography Section (North Carolina 2005) project more modest population increases for Carteret County in the future. As seen in the table 22, Carteret County is projected to grow at a rate under 1% per year for the next 14 years.

EMPLOYMENT

As noted above, Carteret County varies in population density. Morehead City is home to a port of the Second Division for the Camp Lejeune Military Base, and there is a correctional center in Newport (DOP 2005). While not located in Carteret, near-by Marine Corps Air Station Cherry Point and Marine Corps Base Camp Lejeune employ many Carteret County residents. There are no major federal facilities, commercial airports, or four-year colleges in the county. However, one of two state ports is located in Morehead City.

The local economy is driven primarily by small businesses, typically employing fewer than 49 workers. Only 52 out of 1,919 businesses operate with more than 50 employees (2003 County Business Patterns). The majority of jobs in the private sector are in retail trade, construction, and accommodations and food services. Together, these three sectors generated approximately 34% of the county's jobs in 2003. Table 23 presents total employment in the county and a percentage distribution of jobs by sector. As seen in the table, those sectors related to tourism, such as real estate (rentals, vacation homes, and timeshare properties) retail trade, and accommodations, are major drivers of private sector employment. Overall, government jobs comprise the majority of jobs in the public sector, followed closely by retail trade. The mining, utilities, and management of companies sectors contribute the least to the overall employment status of the region.

TABLE 21: HISTORICAL POPULATION LEVELS

Location	1970	1980	1990	2000	2004
Carteret County	31,603	41,092	52,553	59,383	62,034
North Carolina	5,084,411	5,880,086	6,632,448	8,049,313	8,541,221
United States	203,211,926	226,545,805	248,709,873	281,421,906	

Source of 1970, 1980, and 1990, and 2000 data: U.S. Census Bureau, U.S. Census 2000.

Source of 2004 data: U.S. Census Bureau, U.S. Census 2005.

TABLE 22: POPULATION PROJECTIONS FOR THE ROI COUNTY

	July 2005	July 2010	July 2015	July 2020	Annual % Change 2005-2010	Annual % Change 2010-2015	Annual % Change 2015-2020
Carteret	62,436	64,928	67,128	69,000	0.78	0.67	0.55

Source: North Carolina State Demographic Section 2005

TABLE 23: EMPLOYMENT

Industry Sector	Carteret County (Number)	Carteret County (%)
Agric. Ser., Forestry, Fishing	1,053	3.2
Mining	10	0.03
Construction	2,953	8.9
Utilities	131	0.4
Manufacturing	1,857	5.6
Wholesale Tr.	777	2.3
Retail Trade	4,771	14.3
Trans and Warehousing	514	1.5
Information	402	1.2
Finance and Insurance	768	2.3
Real Estate	2,130	6.4
Prof. Tech. Services	1,613	4.8
Mgmt. of Companies	67	0.2
Adm. And Waste Services	1,846	5.5
Educational Services	212	0.67
Health Care	2,085	6.3
Arts & Recreation	1,062	3.2
Accommodations Food Services	3,611	10.8
Other Services	2,417	7.3
Government	4,847	14.6
Total Employment	33,297	100

Source: BEA 2005

The Carteret County unemployment rate has drifted upward in recent years from 4.2% in 2000 to an average 4.7% in 2004. Unemployment spiked in 2002 with 6% of the population out of work. Due to population growth, the percentage of unemployed has gone down while the actual number of people not working has continued to grow since 2002. Overall, Carteret County's 2004 unemployment rate was lower than the 2004 national unemployment rate of 5.5%.

TOURISM CONTRIBUTIONS TO THE ECONOMY

Carteret County's economy is somewhat driven by the region's tourist draw, mainly during the summer months. The region has experienced an almost uninterrupted growth in this sector for more than a decade. The North Carolina Department of Commerce has estimated that since 1990, annual revenues generated by the tourism sector have increased from \$132.03 million to \$236.24 million in 2004, an increase of 179%. Over the past few years, average growth per annum has been 5%.

Tourism in the county generates part of the region's employment. The North Carolina Department of Commerce estimated that in 2004, 3,320 jobs in the ROI were attributable to tourism. Accordingly, tourism-related jobs accounted for 10% of all jobs in Carteret County based on the total employment estimate.

The tourism sector is also a source of government revenues. According to the North Carolina Department of Commerce, tourism provided over \$27 million in tax revenue during 2004.

PERSONAL INCOME AND UNEMPLOYMENT

The per capita income of Carteret County has increased faster than the national per capita income (PCI) during the period from 1993 to 2003. As shown in table 24, while the county still has PCI levels lower than the United States, Carteret County has been able to substantially reduce the gap in the last decade. Carteret County was able to increase its PCI from 65% of the national PCI in 1993 to nearly 90% of the PCI in 2003. Carteret County surpassed the PCI of North Carolina in 2003 as well.

The county's robust economic growth, including a substantial increase in per capita income over the last 10-year period, can be attributed to a number of factors including growth in coastal tourism, expansion of local military installations resulting from Base Realignment and Closure (BRAC) actions, and an influx of retirees.

HOUSING

Local housing stock is summarized in table 25, which identifies both owner-occupied and renter-occupied homes, along with median home values. As a tourist destination, the county's housing stock includes a substantial proportion of vacation homes, also identified in the table. In 2000, 33% of the units in Carteret County were classified as seasonal or vacation homes. In comparison, about 3% of the housing units nationally are classified vacation or seasonal units.

TABLE 24: PER CAPITA INCOME OF ROI, NORTH CAROLINA, AND THE UNITED STATES

	2003 Per Capita Income	1993 Per Capita Income*	Percentage Change Between 1993 and 2003	Percentage US Per Capita Income, 1993
Carteret County	\$28,239	\$17,626	38%	65%
North Carolina	\$28,071	\$24,926	11%	92%
United States	\$31,472	\$27,181	14%	100%

Source: BEA 2004

TABLE 25: HOUSING CHARACTERISTICS FOR CARTERET COUNTY

	Carteret County
Total Housing Units	40,947
Occupied Housing Units	25,204
Owner-occupied	19,316
Renter-occupied	5,888
Vacant Housing Units	15,743
Vacant for Seasonal, Recreational, or Occasional Use	13,333
Median Home Value (Owner-occupied)	\$123,900

Source: U.S. Census Bureau, U.S. Census 2000

Carteret County's housing market could be characterized as growing, with an estimated 1,143 units added between 2000 and 2002. At the end of 2002, it was estimated that the total number of housing units in Carteret County increased to 42,090, an increase of almost 10% since the 2000 census. The estimated median value of owner-occupied units in Carteret County is \$123,900, above the nationwide median value of \$119,600 (U.S. Census Bureau, U.S. Census 2000).

QUALITY OF LIFE

Quality of life encompasses those attributes or resources (man-made or naturally occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective (e.g., some individuals consider outdoor recreational opportunities essential to their well-being, others require access to cultural institutions essential to their quality of life, and still others may hold public safety as their primary quality of life concern). Quality of life analyses typically address issues relating to potential impacts of the proposed action on the availability of public services and leisure activities that contribute to quality of life of inhabitants in an affected ROI. For purposes of this plan/EA, the quality of life affected environment includes public schools, law enforcement, medical facilities, and fire protection services. Recreational opportunities, including sporting, shopping, and cultural resources are also described.

SCHOOLS

The county has one public school district with a total of 16 primary and secondary schools serving a student population of about 8,300 (table 26). The Carteret County schools have a student/teacher ratio of 12.8, lower than the state and national averages of 16.8 and 15.9, respectively (NCReport card 2005). The public school district provides education facilities for those students residing in the communities throughout the counties in pre-kindergarten through 12th grade, and the Carteret County Schools are operating at capacity.

The public school district in the county receives funding from local, state, and federal sources. However, the most revenues to public schools are provided through the Public School Finance Act of 1994 (as amended). This legislation provides for school funding via state taxes, vehicle registration taxes, and local property taxes (PSNC 2003). The county receives the majority of its funds (38%) from the state (NCReportcard 2004).

TABLE 26: PUBLIC SCHOOLS IN THE REGION OF INFLUENCE

School Districts	Elementary	Inter- mediate	Middle/ Junior High	Junior/ Senior High	High Schools	Other Schools	Total Number of Schools
Carteret County							
Atlantic		1					1
Beaufort	1		1				2
Bogue Sound	1						1
Broad Creek			1				1
Croatan					1		1
East Carteret					1		1
Harkers Island		1					1
Morehead City	2		1				3
Newport	1		1				2
Smyrna	1						1
West Carteret					1		1
White Oak	1						1

Source: Carteret County Schools 2005

PUBLIC SAFETY

POLICE SERVICES

Table 27 shows a total of 191 law enforcement personnel, including sheriffs, deputies, police officers, dispatchers, and other staff operating within the County. Together, these law enforcement personnel cover a land area of about 519 square miles and a population of 62,436. This averages out to about 1 law enforcement employee per 2.7 square miles, and about one staff person per 327 people.

FIRE SERVICES / EMERGENCY MEDICAL SERVICES

Fire protection services are provided through both career and volunteer fire departments in Carteret County. Table 28 lists fire protection personnel by department. Many of the fire departments have mutual aid agreements to provide fire-fighting assistance when needed.

A central emergency dispatch and response 911 service is available in the ROI. Four of the fire departments also run an Emergency Medical Service (EMS) sector, which services the areas of Carteret County.

HEALTH CARE FACILITIES

Carteret General Hospital in Morehead City is the only 24-hour emergency care hospital in the county and was built in 1967. The hospital employs 56 active staff physicians, 45 consulting physicians, and 12 visiting/courtesy physicians. The hospital has 46 beds in the emergency room and 117 beds overall. Carteret General Hospital's patient services include 28 medical specialties (CGH 2004).

TABLE 27: POLICE RESOURCES FOR THE ROI

Agency	Full-Time Employees
Carteret County ¹	
Atlantic Beach	34
Beaufort	18
Cape Carteret	6
County Sheriff's Office	55
Emerald Isle	19
Indian Beach	4
Morehead	35
Newport	6
Pine Knoll Shores	14
Total ROI	191

¹ Source: City-Data 2004**TABLE 28: FIRE PROTECTION PERSONNEL FOR THE ROI**

Agency	Staff/Volunteers
Carteret County ¹	
Atlantic Beach	33
Davis	24
Emerald Isle	24
Morehead City	35
Pine Knoll Shores	37
Salter Path	35
Sea Level	24
South River	41
Town of Beaufort	35
Total ROI	288

¹ Source: Capitolimpact.com, 2004

RECREATION

There are many outdoor recreation opportunities in the ROI. The Carteret County Parks and Recreation areas are split into eight sections. Eastern Park, Harkers Island, Freedom Park, Mariners Park, Newport, Salter Path, Swinson Park, and Western Park each have a variety of athletic fields, playgrounds, and picnic areas (CCP&R). As a part of the Crystal Coast, Carteret County offers a wide variety of water activities as well. Windsurfing, fishing, boating, surfing, sailing, hang gliding are all popular choices. There is also an extensive trails system that can be used for walking, jogging, or biking. Carteret County is home to five public golf courses, the North Carolina Maritime Museum, the North Carolina Aquarium, and the civil war-era Fort Macon. In addition, there is a large variety of retail shops in the area ranging from clothing to specialty items to tourist-related items (CCCC 2005). Parks and forests in the county include Cape Lookout National Seashore, Hammock's Beach State Park, Fort Macon State Park, and Croatan National Forest.

SEASHORE MANAGEMENT AND OPERATIONS

Seashore management and operations as it relates to species management is comprised of interpretation, resource management, law enforcement, maintenance, and administrative staff at Cape Lookout National Seashore. Within each of these divisions, both staff time and financial resources partially dictate the level of natural resource protection that can occur. Resource management activities consist of surveying and management for protected species, as well as interpretation programs to inform seashore visitors about these species. This section describes typical natural resource management responsibilities and associated costs for the Interpretation, Resource Management, and Law Enforcement divisions.

INTERPRETATION DIVISION

Staff in the Interpretation Division participate in natural resource management activities by informing seashore visitors about the protected species in the seashore. Activities related to resource management conducted by the Interpretation Division include providing informational brochures at the visitor center about the seashore's endangered species; educating visitors through posted signs, site bulletins, and interpretive programs; sending press releases notifying the public of non-routine closures that affect ORV driving; and maintaining the seashore's website with up-to-date closure information.

The Interpretation Division is lead by the Chief Ranger (responsible for Interpretation and Law Enforcement operations), who spends approximately 13% of his time on resource management / interpretation activities. The remaining interpretive staff, consisting of two full-time interpreters, two seasonal interpreters, one seashore guide, and one 6-month Student Conservation Association employee, spend approximately 25% of their time on resource management activities. Based on the amount of time these staff members spend on protected species management activities, it is estimated that these activities in the Interpretation Division cost approximately \$76,088 annually for staff and materials.

RESOURCE MANAGEMENT DIVISION

Resource management staff responsibilities include surveying and management of the endangered species found at the seashore. The natural resource management staff is lead by the Chief of Resource Management, who spends approximately 50% of his time on protected species management activities. The remaining staff that devote time to resource management activities is comprised of one biologist, one seasonal biological technician and two 12-week Student Conservation Association employees. The amount of staff time devoted to protected species management in the resource management division totals approximately \$130,000 annually. As described under the no-action alternative, these employees are responsible for surveying and management activities for the threatened or endangered piping plover, sea turtles, and seabeach amaranth, as well as the species of special concern.

In addition to staff time, \$25,500 is required for materials and supplies such as signs, radios, cell phones, fuel, boats, and other supplies. Of this total, approximately \$4,500 is allocated for Student Conservation Association employee support including housing, utilities, ferry transportation, personal vehicle mileage, and back country per diem. The total approximate cost for natural resource management staff time and materials is \$155,500 annually.

LAW ENFORCEMENT DIVISION

Law enforcement staff are responsible for monitoring compliance, responding to incidents and violations, investigating violations, and enforcing visitor compliance with regulations, laws, and closures. Although they share responsibility with interpretation and resource management staff for educating visitors about species protection, they are the only staff authorized to take legal action against violations.

An education program, coupled with the certainty of enforcement action, including issuance of violation notices and arrests, is the key to good visitor compliance with closures.

The law enforcement staff is led by the Chief Ranger (responsible for Interpretation and Law Enforcement operations) who spends about 10% of his time on natural resource / law enforcement activities. The remaining field staff is composed of one supervisor and one law enforcement ranger who spend between 25% and 75% of their time respectively related to protected species management activities, and two seasonal law enforcement rangers who spend 100% of their time related to these activities. Although field law enforcement staff perform species protection duties concurrently while performing other patrol activities, their time is not dedicated and is subject to diversion due to local and national emergencies. The cost of law enforcement staff time for resource management totals approximately \$186,425. An additional \$60,300 is required for materials and supplies such as vehicle costs, boat costs, and miscellaneous supplies. Under the existing condition, there are no law enforcement staff dedicated to working at the education/entrance stations and providing a first contact with seashore visitors at the ferry landings where ORV users arrive at the seashore. At the current level of enforcement staffing and due to factors such as: the logistics of getting to the islands, and the ability of visitors to access and distribute themselves throughout the 5 remote and distinct islands of the 56-mile seashore, it is likely that enforcement presence will be low. The total approximate cost for law enforcement staff time and materials is \$246,725 per year.

ADDITIONAL AND UNFORESEEN STAFF REQUIREMENTS

Occasionally, conditions are such that the seashore staff implement additional species protection measures that go beyond the typical species management, requiring staff from the Interpretation, Resource Management, and Law Enforcement divisions to spend more of their time devoted to species protection activities. An example of these measures is the escort program that has been implemented in the past. During these limited escorts, seashore staff would generally conduct only two escorts daily, one in the morning and one in the afternoon, to allow ORVs to get through species closures that blocked a larger portion of the seashore. However, since escorts are labor intensive and overall available staffing is minimal, opportunities for providing escorts are very limited both in the number of locations and in the span of time that can be accommodated.

During times when these limited escorts are needed, the level of resource management, interpretation, and law enforcement staff does not increase, resulting in a decrease in some of the typical surveying and management activities. Other unforeseen situations can involve emergencies that require the resources of the law enforcement staff, or other incidents involving all employees at the seashore, such as responding to storm events, and may result in a temporary reduction in the amount of protected species surveying and management that can occur.

FUNDING SOURCES

In addition to traditional funding sources, such as the annual budgeting process, Cape Lookout National Seashore can seek and use funding from other nontraditional sources to fund park programs. The park currently collects fees from visitor use of long-term vehicle parking at the seashore; this funding (approximately \$66,000 per year) is used to fill two seasonal law enforcement staff.

Environmental Consequences

ENVIRONMENTAL CONSEQUENCES

SUMMARY OF LAWS AND POLICIES

Three overarching environmental protection laws and policies guide the National Park Service — the National Environmental Policy Act (NEPA) of 1969, and its implementing regulations; the National Parks Omnibus Management Act of 1998 (NPOMA); and the NPS Organic Act.

1. The National Environmental Policy Act is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500–1508). The National Park Service has in turn adopted procedures to comply with the act and the CEQ regulations, as found in *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001a), and its accompanying handbook.
2. The National Parks Omnibus Management Act of 1998 (NPOMA) (16 USC 5901 et seq.) underscores the National Environmental Policy Act in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both also recognize that such data may not be readily available, and they provide options for resource impact analysis should this be the case.

The Omnibus Act directs the National Park Service to obtain scientific and technical information for analysis. The NPS handbook for *Director's Order 12* states that if “such information cannot be obtained due to excessive cost or technical impossibility, the proposed alternative for decision will be modified to eliminate the action causing the unknown or uncertain impact or other alternatives will be selected” (sec. 4.5).

Director's Order 12 goes on to state, “When it is not possible to modify alternatives to eliminate an activity with unknown or uncertain potential impacts, and such information is essential to making a well-reasoned decision, the NPS will follow the provisions of the regulations of CEQ (40 CFR 1502.22).” In summary, the National Park Service must state in an environmental assessment or impact statement (1) whether such information is incomplete or unavailable; (2) the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific adverse impacts that is relevant to evaluating the reasonably foreseeable significant adverse impacts; and (4) an evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community.

3. The 1916 NPS Organic Act (16 USC 1) commits the National Park Service to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

GENERAL METHODOLOGY FOR ASSESSING IMPACTS

The general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category includes the following elements:

- General analysis methods as described in guiding regulations

- Basic assumptions used to formulate the specific methods used in this analysis

- Thresholds used to define the level of impact resulting from each alternative

- Methods used to evaluate the cumulative effects of each alternative in combination with unrelated factors or actions affecting park resources

- Methods and thresholds used to determine if impairment of specific resources would occur under any alternative

GENERAL ANALYSIS METHODS

The analysis of impacts follows CEQ guidelines and *Director's Order 12* procedures (NPS 2001a) and is based on the underlying goal of species protection. This analysis applies the results of scientific research and survey along with the best available scientific literature applicable to the region and setting, the species being evaluated, and the actions being considered in the alternatives.

The interdisciplinary planning team created a process for impact assessment, based upon the directives of the *DO 12 Handbook* (sec. 4.5(g)). National park system units are directed to assess the extent of impacts on park resources as defined by the context, duration, and intensity of the effect. While measurement by quantitative means is useful, it is even more crucial for the public and decision-makers to understand the implications of those impacts in the short- and long-term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists. With interpretation, one can ascertain whether certain impact intensity to a park resource is “minor” compared to “major” and what criteria were used to base that conclusion.

To determine impacts, methodologies were identified to measure the change in park resources that would occur with the implementation of the alternatives. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions, both adverse and beneficial, of the various management alternatives.

Potential impacts are described in terms of type (Are the effects beneficial or adverse?), context (Are the effects site-specific, local, or even regional?), duration (Are the effects short-term, lasting less than one year, or long-term, lasting more than one year?), and intensity (Are the effects negligible, minor, moderate, or major?). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document.

Each alternative is compared to a baseline to determine the context, duration, and intensity of resource impacts. For purposes of impact analysis, the baseline is what occurred at the seashore in 2004 with regard to protected species management (See the “Alternatives” chapter for a complete description of alternative A). The team assumed, for the purposes of analysis that actions taken in 2004 would continue over the next four years. This is sometimes referred to the “No-Action or Existing Management Continued” alternative. The action alternatives are then compared against alternative A to determine the relative change or effect to park resources, visitor experience and other impact topics. In the absence of quantitative data, best professional judgment was used to determine impacts. In general, the thresholds used come from existing literature, federal and state standards, and consultation with subject matter experts and appropriate agencies.

For the purposes of analysis, the following assumptions are used for all impact topics:

- Direct impacts:* Direct impacts are those that are caused by, or connected to management of protected species and recreational use. For example, the seabeach amaranth may be directly impacted from trampling.
- Indirect impacts:* Indirect impacts are those that are further removed from the action or activity either geographically or through time. For example, there may be indirect, beneficial effects to the seabeach amaranth from seed dispersal caused by human and natural occurrences.
- Duration:* The duration of an impact varies according to the resource area evaluated. Therefore, the following is an example and the duration is defined under each impact topic.
- Short-term impacts:* Those impacts occurring over the course of one year or less. Some short-term impacts could occur over several days, or a nesting season spanning several months. Other short-term impacts (socioeconomic, for example) may be more measurable over the course of a year.
- Long-term impacts:* Those impacts occurring over several years.
- Study area:* Each resource impact is assessed in direct relationship to those resources affected both inside and outside the park, to the extent that the impacts can be substantially traced, linked, or connected to the proposed action. Each impact topic, therefore, has a study area relative to the resource being assessed, and it is further defined in the impact methodology.

CUMULATIVE IMPACTS

The CEQ regulations to implement the National Environmental Policy Act require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Cape Lookout National Seashore and, if applicable, the surrounding region. Table 29 summarizes these actions that could affect the various resources at the seashore, and the cumulative scenario describes these actions in more detail.

The analysis of cumulative effects was accomplished using four steps:

Step 1—Resources Affected. Fully identify resources affected by any of the alternatives

Step 2—Boundaries. Identify an appropriate spatial and temporal boundary for each resource.

Step 3—Cumulative Action Scenario. Determine which actions to include with each resource.

Step 4—Cumulative Impact Analysis. Summarize x + y statements, proposed action plus cumulative action, defining context, intensity, duration and timing; defining thresholds, methodology, etc.

TABLE 29: CUMULATIVE IMPACT SCENARIO

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (3 years)
Federally Listed Threatened and Endangered Species	Specific to species as identified in their Recovery Plans	Horse Management Plan Concessionaires and ferry operations Storms and other weather events Dredging Beaufort Inlet Commercial fishing Military overflights	Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA Horse Management Plan Concessionaires and ferry operations Dredging Beaufort Inlet Dredging Oregon Inlet Commercial fishing Military overflights	Cape Lookout National Seashore Long-term ORV Management Plan/EIS Horse Management Plan Comprehensive Interpretation Plan Stabilization of Historic Structures Project Concessionaires and ferry operations Dredging Oregon Inlet Dredging Beaufort Inlet Commercial fishing Military overflights Cape Hatteras National Seashore Long-term ORV Management Plan/EIS
Other Protected Species	North Carolina populations	Horse Management Plan Concessionaires and ferry operations Dredging Beaufort Inlet Storms and other weather events	Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA Horse Management Plan Concessionaires and ferry operations	Cape Lookout National Seashore Long-term ORV Management Plan/EIS Comprehensive Interpretation Plan Horse Management Plan Stabilization of Historic

TABLE 29: CUMULATIVE IMPACT SCENARIO

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (3 years)
			Dredging Beaufort Inlet	Structures Project Concessionaires and Ferry Operations Dredging Beaufort Inlet Dredging Oregon Inlet Cape Hatteras National Seashore Long-term ORV Management Plan/EIS
Visitor Use and Experience	Park Boundary	Horse Management Plan Concessionaires and ferry operations Storms and other weather events	Horse Management Plan Cape Lookout Historic District Management Plan Concessionaires and ferry operations	Cape Lookout National Seashore Long-term ORV Management Plan/EIS Comprehensive Interpretation Plan Horse Management Plan Cape Lookout Historic District Management Plan Harkers Island and Cape Lookout Keepers' Quarters Exhibit Plan Wayside Exhibit Plan Stabilization of Historic Structures Project Concessionaires and ferry operations Cape Hatteras National Seashore Long-term ORV Management Plan/EIS
Socioeconomics	Regional	Concessionaires and ferry operations Storms and other weather events	Concessionaires and ferry operations	Cape Lookout National Seashore Long-term ORV Management Plan/EIS Commercial Services Plan Cape Lookout Historic District Management Plan Concessionaires and ferry operations Cape Hatteras National Seashore Long-term ORV Management Plan/EIS Carteret County Comprehensive Plan
Cape Lookout National Seashore Management and Operations	Regional	Concessionaires and ferry operations Storms and other weather events	Concessionaires and ferry operations	Cape Lookout National Seashore Long-term ORV Management Plan/EIS Commercial Services Plan Comprehensive Interpretation Plan Harkers Island and Cape Lookout Keepers' Quarters Exhibit Plan Wayside Exhibit Plan Stabilization of Historic Structures Project Concessionaires and ferry operations

CUMULATIVE IMPACTS

The past, present, and future actions outlined in table 29 are described in the Related, Laws, Policies, Plans, and Constraints section starting in the “Purpose of and Need for Action” chapter. Recreational use, past, present, and future, is considered as an integral part of the action alternatives and is, therefore, not addressed within the cumulative impact scenario.

IMPAIRMENT ANALYSIS

The NPS *Management Policies 2001* require an analysis of potential effects to determine whether actions would have the potential to impair park resources. The fundamental purpose of the National Park system, as established by the Organic Act and reaffirmed by the Redwood National Parks Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within a park system unit, that discretion is limited by the statutory requirement that the agency must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values.

An impact on any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park.

The following process was used to determine whether the alternatives had the potential to impair park resources and values:

1. The park's enabling legislation, the *General Management Plan* (NPS 2001b), the *Strategic Plan* (NPS 2000b), and other relevant background were reviewed with regard to the unit's purpose and significance, resource values, and resource management goals or desired future conditions.
2. Management objectives specific to resource protection goals at the park were identified.
3. Thresholds were established for each resource of concern to determine the context, intensity and duration of impacts, as defined above.
4. An analysis was conducted to determine if the magnitude of impact reached the level of "impairment," as defined by NPS *Management Policies 2001* (NPS 2000a).

The impact analysis includes any findings of impairment to park resources and values for each of the alternatives. Impairment findings are made for park resources affected by the alternatives. Park operations and management, socioeconomics, and visitor use are not considered park resources; therefore, impairment findings are not included as part of the impact analysis for these topics.

FEDERALLY LISTED SPECIAL STATUS WILDLIFE AND PLANT SPECIES

GUIDING REGULATIONS AND POLICIES

The Endangered Species Act (16 USC 1531 et seq.) mandates all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the National Park Service determines that an action may adversely affect a federally listed species, consultation with the U.S. Fish and Wildlife Service is required to ensure that the action would not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. NPS *Management Policies 2001* also state that NPS "manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible" (sec. 4.4.2.3). The National Park Service is thus required to control access to such species' critical habitat, to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend, and in so doing, to consider the potential effects agency actions will have on these species.

METHODOLOGY AND ASSUMPTIONS

The following information was used to assess impacts on listed species:

1. which species are found in areas likely to be affected by management actions described in the alternatives
2. habitat loss or alteration caused by the alternatives
3. displacement and disturbance potential of the actions and the species' potential to be affected by the activities

Specific methodologies that were implemented and assumptions that were made that pertained to the piping plover, sea turtles, or seabeach amaranth are described under the relevant species impact analysis below.

STUDY AREA

The study area for federally listed species is defined as the seashore for the analysis of the impacts of the alternatives and defined regionally for the analysis of cumulative impacts, according to the recovery plans for each species.

IMPACT THRESHOLDS

The Endangered Species Act defines the terminology that is used to assess impacts on the piping plover, sea turtles, and seabeach amaranth as follows:

<i>No effect:</i>	When a proposed action would not affect a listed species or designated critical habitat.
<i>May affect / not likely to adversely affect:</i>	When effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not

(1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

May affect / likely to adversely affect:

When any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial. If the overall effect of the proposed action is beneficial or of negligible effect to the listed species, but is also likely to cause some adverse effects, the proposed action “is likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, then it “is likely to adversely affect” the species. Incidental take is the take of a listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity.

Is likely to jeopardize proposed species / adversely modify proposed critical habitat (impairment):

The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies an adverse effect that could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside seashore boundaries.

PIPING PLOVER

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on piping plover populations and habitat were evaluated based on available data on the species’ past and present occurrence at Cape Lookout National Seashore, as well as the species’ association with humans, pets, predators, and off road vehicles. Information on habitat and other existing data were acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to the piping plover from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Alternative A would continue to include a range of surveying activities across pre-nesting, nesting, migration, and over-wintering life stages. Surveying would continue to bring staff into direct, short-term contact with piping plovers and piping plover habitat, and these activities are a known, short-term risk factor (Burger 1994). However, staff would continue to take precautions to minimize impacts during surveying, and surveying would continue to provide benefits to the species as the information gathered would be to better protect piping plovers. Therefore, species surveying may affect/is not likely to adversely affect piping plovers and their habitat.

Alternative A includes delineating full recreational closures around piping plover active nesting habitat beginning in April each year. Establishing these closures through placement of symbolic fencing and signage is itself a known short-term risk factor (Burger 1994). Conversely, establishing full recreational closures around active nesting habitat provides a major deterrent to the entry of people, pets, and ORVs into piping plover habitats, and the 150- to 600-foot buffers around nests and foraging habitat respectively would provide protection at critical life stages. All closures would be removed when chicks have fledged

or have been confirmed to be lost. Overall, species management under alternative A may affect /is not likely to adversely affect piping plovers and their habitat.

In addition, staff would continue to erect predator exclosures over piping plover nests once they contain 3 or 4 eggs. A study to evaluate the consequences of predator removal for endangered species at Cape Lookout National Seashore would proceed as previously proposed. Both actions may affect/ are not likely to adversely affect piping plovers and their habitat as the protection of nests and the associated research would only benefit the species with the reduction in that threat.

Recreation Use. Alternative A provides for opportunities for a variety of recreation uses that have the potential to expose piping plovers to direct impact from ORV driving, boat access, and pedestrian and pet access. In alternative A, an ORV closure of at least 150 feet is established around nests, and would be expanded to 600 feet when the chicks emerge. When ORV access is prohibited due to the presence of chicks on the beach, pedestrian access (including leashed pets) is maintained. Direct impacts from recreation can occur due to the presence of pedestrians during the chick phase.

Waste (food, trash, fish bait, etc.) associated with recreation activities within Cape Lookout National Seashore can lead to a greater number of predators within piping plover habitat. Predators are considered to be one factor in nest failure for piping plover and other ground nesting birds within the seashore (NPS 2006).

ORV closures and seashore regulations under alternative A provide a major deterrent to the entry of ORVs into piping plover habitat. However, pedestrians and their leashed pets are still afforded access into these nesting areas, potentially bringing people and their pets and other recreational equipment into direct contact with piping plovers and piping plover habitat (NPS 2006). Additionally, piping plovers are highly mobile at all life stages and can range outside of designated ORV closure areas before surveying and management can respond. Recreation use can lead to increased numbers of predator species (attracted to recreation refuse) within piping plover habitat. For these reasons, recreation use at the seashore may affect/is likely to adversely affect piping plovers and their habitat.

Other Seashore Management. Under alternative A, outreach efforts would continue to include the distribution of informational brochures at the visitor center on the seashore's endangered species and providing the visiting public educational materials through posted signs, site bulletins, interpretive programs, press releases notifying the public of non-routine closures that affect ORV driving, and the Cape Lookout National Seashore website. Outreach efforts would have no effect or provide beneficial impacts on piping plover and thus would affect/are not likely to adversely affect piping plover.

Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A includes one supervisor, one field ranger, and two 6-month seasonal rangers, which together provide compliance monitoring for up to 2 to 3 days per week at North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Species protection is performed concurrently with other duties in the field. Actual coverage is likely to be substantially lower than 2 to 3 days per week, per area, since law enforcement staff are subject to time consuming enforcement actions, local emergency responses, and mandatory long-term participation in national emergencies (e.g., hurricanes, homeland security, fire, etc.). Because night enforcement is staff intensive and would heavily impact time available for day enforcement, regularly scheduled nighttime enforcement activities would not occur under alternative A. Compliance would have no effect or provide beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the piping plover

nesting. Overall, the predator removal study could have beneficial impacts on piping plovers because predators play such a substantial and harmful role in the breeding performance of this species at Cape Lookout National Seashore. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect/are not likely to adversely affect piping plover.

Cumulative Impacts

The past, current, and future actions discussed under the cumulative impact scenario would be expected to have a range of impacts on piping plover. Dredging of Beaufort Inlet and Oregon Inlet to the north at Cape Hatteras National Seashore may affect/is likely to adversely affect piping plover when piping plover are holding territories and/or attempting to nest within the vicinity of the dredging activity. Maintenance dredging of the two inlets could result in long-term habitat building that may affect / is not likely to adversely affect piping plover nesting and/or overwintering/foraging habitat. Impacts would depend on the timing and duration of the maintenance dredging as well as the type and placement of the dredge spoils. For example, if the dredged material is placed at sea then dredging impacts could be negligible or slightly adverse if the noise from dredging activities disturbs nesting piping plover. However, if the dredge spoils are used to build habitat on spoil islands, for example, that could be beneficial.

Similarly, the stabilization of historic structures could have both short-term impacts, especially if it takes place during the breeding of piping plover and if it encroaches on any nest buffers or ORV closures. If this were the case, it would result in direct, short-term impacts that may affect / are not likely to adversely affect nesting success. Conversely, the stabilization of historic structures project is unlikely to result in either stabilizing or creating new bird nesting habitat. The degree to which this activity is beneficial or adverse is a function of the extent, timing, and location of the activity itself relative to piping plover nesting and to the degree to which the activity results in the creation or maintenance of high-quality piping plover habitat.

Storms and other weather events during the breeding season of piping plovers can result (depending on storm intensity), in disturbance of nesting birds or even in the loss of nests or eggs. These impacts may affect / are likely to adversely affect nesting piping plovers. Storm severity also plays an important role. Powerful storms can cause tidal surges that overwash large areas of breeding habitat and result in loss of scrapes, nests, eggs, chicks and even breeding adults. Winter, late-fall, and early-spring storms may provide long-term minor to moderately beneficial impacts on piping plovers by depositing new materials and creating overwash areas and, hence, new nesting habitat for piping plovers, or can have long-term minor to moderately adverse impacts by eroding and removing otherwise suitable habitat. Hence, the impact scenario of storms and nesting piping plovers depends on the timing and severity of storm events and whether they result in net habitat creation or loss.

Hurricanes can also affect the piping plover because of their impact on staff resources. Recovery that pulls staff from resource management (and presumably surveying) activities during piping plover breeding season would have a short-term adverse effect. Because the hurricane season overlaps essentially the entire piping plover breeding season, the loss of staff services may affect / is likely to adversely affect piping plovers at Cape Lookout National Seashore.

The horse management plan, concessionaires and ferry operations, and the comprehensive interpretation plan would all have negligible impacts on piping plovers. However, the proposed North Carolina state listing of Wilson's plover and American oystercatcher could have long-term beneficial impacts on piping plovers to the extent that listing results in additional protection to nesting habitat of piping plovers and therefore may affect / is not likely to adversely affect piping plovers at Cape Lookout National Seashore.

Several of the local and NPS past, current, and future planning efforts may affect / are not likely to adversely affect piping plovers at Cape Lookout National Seashore. The outcome of the current action to

develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA would have direct, short-term impact on piping plovers which could move back and forth between the two parks during nesting, migration and overwintering. However, whether the impact of the Strategy/EA would be beneficial or adverse to piping plovers would depend upon the management decisions that are made and ultimately implemented. Overflights by military or other aircraft could result in short-term negative impacts that could be minor or major depending on the height of these flights and their timing relative to various life stages of piping plovers at Cape Lookout National Seashore.

Other future planning efforts include the development of long-term ORV management plan/EISs for both Cape Lookout National Seashore and Cape Hatteras National Seashore, which would have direct, long-term impacts that may affect / are not likely to adversely affect piping plovers at Cape Lookout National Seashore. However, whether the impact of these two ORV plans would be beneficial or adverse to piping plovers would depend upon the management decisions that are made and ultimately implemented.

The overall cumulative impact of these past, current, and future actions, combined with the effects of actions under alternative A, may affect / are likely to adversely affect piping plover.

Conclusion

Continued seashore management under alternative A may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Alternative B includes a range of surveying activities across pre-nesting, nesting, migration, and over-wintering life stages. Surveying brings people into direct, short-term contact with piping plovers and piping plover habitat, and these activities themselves are a known, short-term risk factor (Burger 1994). And while surveying begins earlier and is more frequent under alternative B than alternative A, many precautions would be taken by seashore staff to minimize impacts during surveying. The surveying can provide benefits to the species if the information gained is used to better protect piping plovers. Therefore, species surveying may affect / is not likely to adversely affect piping plovers and their habitat.

Alternative B includes establishing full recreational closures, using symbolic fencing and signage, as detailed under alternative A. These management activities can be a known short-term risk factor (Burger 1994). Conversely, the closures and subsequent routing of ORVs to an available backroad, provides a major deterrent to the entry of people, pets, and ORVs into piping plover habitats. Furthermore, as in alternative A, the 150 to 600 foot buffers would provide protection at critical life stages. All closures would be removed when chicks have fledged or have been confirmed to be lost. Overall, species management under alternative B may affect / is not likely to adversely affect piping plovers and their habitat.

Recreation Use. Alternative B provides for opportunities for a variety of recreation uses that have the potential to expose piping plovers to impacts from ORVs, boat access, and pedestrian access. As in alternative A, an ORV buffer at least 150 feet wide would be established around nests and expanded to 600 feet once the chicks emerge. Pets would be prohibited from entering the seashore from April 15 through August 31. When ORV access is prohibited due to the presence of chicks, pedestrian access (without pets) would be maintained. As in alternative A, ORV closures would be maintained year round at Portsmouth Flats, the interior of Cape Lookout Point, between mile markers 41A and 41B, and Power

Squadron Spit. In addition, ORV would be prohibited seasonally from the 2 miles along the north end of South Core Banks and at Middle Core Banks and “Ophelia Banks.”

Recreation use and the associated waste-stream within Cape Lookout National Seashore can lead to a greater number of predators within piping plover habitat. These predators are considered to be one factor in nest failure for piping plover and other ground nesting birds within Cape Lookout National Seashore (NPS 2006).

Full recreational closures and seashore regulations under alternative B provide a major deterrent to the entry of people, pets, and ORVs into essential piping plover habitats. Under this alternative, pets would be prohibited from the seashore during a large part of the breeding season, a benefit to the species. However, recreation may bring people, ORVs, and other recreational equipment into direct contact with piping plovers and piping plover habitat (NPS 2006). Recreation use can also lead indirectly to a greater number of predators (attracted to recreation refuse) within piping plover habitat. For these reasons, recreation may affect / is likely to adversely affect piping plovers and their habitat.

Other Seashore Management. Under alternative B, outreach efforts would include all the elements of alternative A with the addition of 2 law enforcement rangers to be stationed at Long Point and Great Island ferry landings. The rangers would be responsible for contacting all ORV users entering the seashore 4 days out of 7 per week, 10 hours per day to relay information about species, closures, and pet leash regulations. Use of law enforcement staff in this role would assist with compliance. Outreach efforts would have no effect or provide beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, requiring one supervisor, one field ranger and two 6-month seasonal rangers, who, together, would monitor compliance up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island (see alternative A). Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on piping plover nesting. Overall, the predator removal study could have beneficial impacts on piping plovers because predators play such a substantial and harmful role in the breeding performance of this species at Cape Lookout National Seashore. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect piping plover.

Cumulative Impacts

Cumulative impacts on piping plover under alternative B would be very similar to those described for alternative A. Although alternative B does provide some additional protection, the adverse effects on piping plover from other actions occurring in the region would still exist. Therefore, the impacts of these other actions, added to the effects of actions under alternative B, may affect / are likely to adversely affect piping plover on a regional basis.

Conclusion

Alternative B may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational use at the seashore. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, and surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Alternative C includes a range of surveying activities across pre-nesting, nesting, migration, and over-wintering life stages. Surveying does bring people into direct, short-term contact with piping plovers and piping plover habitat, and these activities themselves are a known, short-term risk factor (Burger 1994). And while surveying begins earlier and is more frequent under alternative C than under alternative A, precautions would be taken by seashore staff to minimize impacts during surveying, and the information gathered would provide benefits to the species if it is used to better protect piping plovers. Therefore, species surveying may affect / is not likely to adversely affect piping plovers and their habitat.

Alternative C includes the management activity of designating full recreational closures using symbolic fencing and signage. Although management activities are a known short-term risk factor (Burger 1994), the closures and routing of ORVs to an available backroad would be a major deterrent to the entry of people, pets, and ORVs into piping plover habitats. The 150- to 600-foot buffers would provide protection at critical life stages. All closures would be removed when chicks have fledged or have been confirmed to be lost. Overall, species management under alternative C may affect / is not likely to adversely affect piping plover and their habitat.

Recreation Use. Alternative C provides for opportunities for a variety of recreation uses that have the potential to expose piping plovers to direct impact from ORVs, boat access, pets, and pedestrian access. Under alternative C, an ORV buffer at least 150 feet wide would be established around nests and expanded to 600 feet once the chicks have emerged. When ORV access is prohibited due to the presence of chicks, pedestrian access (including leashed pets) would be maintained, as with alternative A. As in alternative A, ORV closures would be maintained year round at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, between mile markers 41A and 41B, and Power Squadron Spit. In addition, ORV would be prohibited seasonally from the 2 miles along the north end of South Core Banks and at Middle Core Banks and “Ophelia Banks.”

Recreation use and the associated waste-stream within Cape Lookout National Seashore may lead to a greater number of predators within piping plover habitat. These predators are considered to be one factor in nest failure for piping plover and other ground nesting birds within Cape Lookout National Seashore (NPS 2006).

Full recreational closures and seashore regulations under alternative C provide a deterrent to the entry of people, pets, and ORVs into essential piping plover habitats similar to alternative A. However, recreation may bring people, ORVs, pets and other recreational equipment into direct contact with piping plovers and piping plover habitat (NPS 2006). Furthermore, recreation use also leads indirectly to a greater number of predators (attracted to recreation refuse) within piping plover habitat. For these reasons, recreation may affect/is likely to adversely affect piping plovers and their habitat.

Other Seashore Management. Under alternative C, outreach efforts would include all the elements of alternatives A and B but with the addition of 4 seasonal law enforcement rangers to be stationed at Long

Point and Great Island ferry landings 7 days per week, 10 hours per day to relay information about species and closures. Use of law enforcement personnel in this role would assist with compliance. Under alternative C, new and larger closure signs would be designed for birds and seabeach amaranth and daily morning vehicle closure information would be posted to a map at the ferry landings and to the seashore website. Outreach efforts would have no effect or provide beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours up to 3 to 5 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island with the addition of 3 enforcement rangers. Nighttime enforcement would be the same as alternative B, occurring up to 4 nights per month throughout the seashore. This level of staffing would help mitigate impacts of emergency operations, and mandatory commitments to national emergency responses. Outreach staff at ferry landings and camps would also improve compliance, since visitors would know that enforcement staff are present on North Core Banks and South Core Banks. Enforcement of compliance would have beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on piping plover nesting. Overall, the predator removal study could have beneficial impacts on piping plovers because predators play such a substantial and harmful role in the breeding performance of this species at Cape Lookout National Seashore. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect piping plover.

Cumulative Impacts

Cumulative impacts on piping plover under alternative C would be very similar to those described for alternatives A and B. Although alternative C does provide some additional protection, the adverse effects on piping plover from other actions occurring in the region would still exist. Therefore, the impacts of these other actions, added to the impacts of actions under alternative C, may affect / are likely to adversely affect piping plover on a regional basis.

Conclusion

Alternative C may affect / is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, research, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Alternative D would be similar to alternative A with the addition of surveying piping plover habitat at least 7 days per week on North Core Banks and South Core Banks and one day per week in other areas beginning in mid-April. Alternative D includes a range of surveying activities across pre-nesting, nesting, migration, and over-wintering life stages. Surveying brings people into direct, short-term contact with piping plovers and piping plover habitat, and these activities can be a known, short-term risk factor (Burger 1994). However, precautions would be taken by seashore staff to

minimize impacts during surveying, and the surveying would provide benefits to the species if the information gained is used to better protect piping plovers. Therefore, species surveying may affect / is not likely to adversely affect piping plovers and their habitat.

Full recreational closures under alternative D would be similar to those under alternative A with the addition of all suitable active, historic, and potential new piping plover habitat identified by a qualified biologist and demarcated with symbolic fencing or posts and warning signs on April 1. These closures would be expanded as necessary when nests or nest scrapes are found in new areas. These management activities can be a known short-term risk factor (Burger 1994). Conversely, the closures and routing of ORVs to an available backroad would be a major deterrent to the entry of people, pets, and ORVs into piping plover habitats. The 150- to 600-foot buffers would provide protection at critical life stages. All closures would be removed when chicks have fledged or have been confirmed to be lost. Overall, species management under alternative D may affect / is not likely to adversely affect piping plovers and their habitat.

Recreation Use. Alternative D, like alternative B, provides for opportunities for a variety of recreation uses that have the potential to expose piping plovers to impacts from ORV driving, boat access, and pedestrian access. In alternative D a full recreational closure at least 150 feet wide would be established around nests and expanded to 600 feet around chicks. When ORV access is prohibited due to the presence of chicks, pedestrian access, including leashed pets, would be maintained.

Recreation use and the associated waste-stream within Cape Lookout National Seashore may lead to a greater number of predators within piping plover habitat. These predators are considered to be one factor in nest failure for piping plover and other ground nesting birds within Cape Lookout National Seashore (NPS 2006).

Full recreational closures and seashore regulations under alternative D provide a major deterrent to the entry of people, pets, and ORVs into essential piping plover habitats. However, the recreating public's compliance with closures may not be 100%, and therefore recreation can bring people, ORVs, pets and other recreational equipment into direct contact with piping plovers and piping plover habitat (NPS 2006). Furthermore, piping plovers can be highly mobile at all life stages and can range outside of a bird closure before surveying and management can respond. Recreation use also leads indirectly to a greater number of predators (attracted to recreation refuse) within piping plover habitat. For these reasons, recreation may affect / is likely to adversely affect piping plovers and their habitat.

Other Seashore Management. Under alternative D, outreach efforts would include all the elements of alternative A with the addition of 4 interpretation staff to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay educational information about species and closures. Outreach efforts would have no effect or provide beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Compliance with the established ORV and full recreational closures would be enforced as detailed under alternative A, with compliance monitoring occurring up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Night monitoring would not occur. Enforcement of compliance would have beneficial impacts on piping plover and thus would affect / are not likely to adversely affect piping plover.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on piping plover nesting. Overall, the predator removal study could have beneficial impacts on piping plovers because predators play such a substantial and harmful role in the breeding performance of this species at Cape Lookout National Seashore. The visitor use study could benefit the species once more detailed information regarding use patterns is

available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect piping plover.

Cumulative Impacts

Cumulative impacts on piping plover under alternative D would be very similar to those described for alternative A. Although alternative D does provide some additional protection, the adverse effects on piping plover from other actions occurring in the region would still exist. Therefore, the effects of these other actions, added to the effects of actions under alternative D, may affect/are likely to adversely affect piping plover on a regional basis.

Conclusion

Alternative D may affect/is likely to adversely affect piping plovers, mainly due to the effects of recreational uses. Past, current, and future activities both inside the seashore and within the region, when combined with the impacts of recreation use, surveying and management of the species expected under this alternative, would continue to result in impacts that may affect/are likely to adversely affect the piping plover. Impairment to the piping plover would not occur under alternative D.

SEA TURTLES

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on sea turtle populations and their habitat within Cape Lookout National Seashore were evaluated based on the species' known interaction with humans, pets, recreation, predators, and ORVs, as well as past and present occurrence at the seashore. Information on habitat, occurrence within the seashore, and potential impacts on sea turtles from recreation and other activities was acquired from seashore staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resource Commission, and available literature.

Although five threatened or endangered sea turtle species occur in the waters of North Carolina, only three, the loggerhead, green, and leatherback sea turtles, are known to nest at the seashore with any frequency. The other two species, Kemp's ridley and hawksbill, are only known to occur at the seashore through the occasional stranding, usually due to either prior death or incapacitation due to hypothermia. Kemp's ridley turtles nest almost exclusively on a single beach on the east coast of Mexico, with nesting occurrences outside this area extremely rare. One Kemp's ridley nest has been recorded at Cape Lookout National Seashore (in 2003), and that was one of only two ever recorded in North Carolina. Otherwise the Kemp's ridley is only known to occur at the seashore through the occasional stranding. The hawksbill sea turtle has never been recorded nesting at Cape Lookout National Seashore and is only known to the seashore through one dead stranding in 2003. Therefore this analysis focuses on the three species that nest at the seashore with some frequency: the loggerhead, green, and leatherback sea turtles. For these three species, the analysis focuses on effects to sea turtles from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities. Except for the timing of nest laying activities, the nesting habits for loggerhead, green, and leatherback sea turtles at the seashore are similar. Therefore the analysis generally discusses the impacts on the sea turtles as a group. Impacts on a specific species are noted where they differ from the other sea turtle species.

Sea turtle nesting habitat overlaps protected bird species and seabeach amaranth habitat seaward of the primary dune line. Therefore management for these species would also be beneficial to nesting sea turtles and is included in the analysis. However, the extent to which these closures are beneficial to the turtles would be dependent upon the location, size, and duration of the closures. The analysis assumes that compliance with closures and other regulations (e.g., leash laws, disposal of bait and fish carcasses, etc.) would increase from current levels where alternatives increase the law enforcement staff and monitoring.

It should also be noted that Cape Lookout National Seashore is at or near the northern limit of the breeding range of all three species of sea turtles that nest there. As such it may be difficult to manage the current populations for increased nesting density, especially for the green and leatherback turtles.

Study Area

The study area for assessment of the various alternatives is the seashore. The study area for the cumulative impacts analysis is the state of North Carolina, based on the species recovery plans for the turtles.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Under alternative A, turtle nests would continue to be documented and protected by seashore staff. Though surveys would not cover the entire nesting season, causing some nests to go undetected, many nests laid before June 1 or after August 15 would likely be detected by staff conducting bird surveys who would be driving most of the ocean beach in the seashore regularly beginning on April 1. Since 1990, three turtle nesting occurrences were documented in April, 135 in May, and 2 in September. Though these occurred outside the time frame for daily turtle patrolling, staff patrolling the beaches for other reasons found them. ORVs are not allowed on Shackleford Banks; however, patrolling Shackleford only two to three times per week may result in missed crawls or nests, as pedestrian traffic, blowing sand, or rain may obscure turtle crawls. Most nests laid on Middle Core Banks and “Ophelia Banks” would also not be afforded any protection due to the irregular surveying of these areas due to difficult access. While surveying activities under alternative A could miss some nests, the risk is small; since 1990, following similar practices, less than 1% of nests were known to be missed and hatched without adequate protection.

The nests that go undetected would continue to be subject to multiple threats such as being run over by ORVs, which could destroy eggs or compact the sand to the point where hatchlings are unable to emerge; depredation by raccoons; and loss due to erosion or frequent flooding. Hatchlings emerging from unprotected nests would be at a greater risk of being disoriented by light pollution since wooden light barriers would not have been erected around the nest. If an undetected nest were located in an ORV use area, hatchlings would be subject to impacts associated with tire tracks, as no closure would be erected around the nest to prevent ORV traffic seaward of the nest.

The use of ORVs during daily patrols would cause a very slight risk of a nest or hatchlings being crushed or disturbance to nesting turtles; however, this risk would be minimized by the fact that surveying would occur during the morning while nesting and hatching typically occur at night. Overall, patrolling for crawls and nests daily would be beneficial, as it would allow closure violations/vandalism, predator activity, and hatching events to be detected. In the case of closure violations/vandalism, daily patrols would allow staff to repair any damage to the closure. In the case of predator activity, daily patrols would allow staff to protect those nests with predator exclosures.

While surveying activities under alternative A would provide many benefits, there would be only a slight risk that nests may go undetected and potentially result in disturbance. Therefore, the surveying activities under alternative A may affect / are not likely to adversely affect all species of sea turtles.

Species management under alternative A would continue to have both positive and negative impacts on sea turtles. Nests would initially be subject to small ORV closures and would be marked using reflective tape on the posts, thus increasing the visibility of the turtle nests. However, the initial markings are only 5 feet apart and perpendicular to the shoreline. Such a small closure area would allow vehicles to drive close to the nest; in areas where the beach is narrow and vehicles need to drive higher up on the beach, the need for multiple passes around the nest could enhance erosion. If an ORV accidentally violates a closure area, the small buffer size would also greatly increase the risk that the nest would be run over. Erecting a

closure from the nest to below the high tide line 50 days into the incubation and raking smooth any tire ruts not smoothed naturally by wind or rain would provide a vehicle free/rut free corridor for the hatchlings to make their way to the ocean. Pedestrians and/or their pets are allowed within the ORV closure area, increasing the risk that it could be found and possibly disturbed.

Relocating nests laid in areas prone to erosion or frequent flooding by tides would have both beneficial and negative impacts. Historically, the single greatest impact on hatching success has been weather related events such as hurricanes or other storms which can uncover nests through erosion, flood nests, or bury nests too deep. Relocating nests prone to these events to areas higher up on the beach increases the likelihood that these nests would not be lost. From 1997 to 2004 an average of 53% of the nests found at Cape Lookout National Seashore were relocated to protect them from frequent flooding and erosion. However, in 2005, the U.S. Fish and Wildlife Service and the North Carolina Wildlife Resources Commission recommended that the seashore reduce the number of nests relocated to a target of 30%, preferring to allow nests to exist without human intervention and the potential impacts of relocating them (e.g., altering the sex ratio) (Cordes 2005a). Under alternative A, the seashore would continue to follow U.S. Fish and Wildlife Service guidelines. If the U.S. Fish and Wildlife Service continues to recommend a target of 30%, some nests laid in areas prone to frequent flooding or erosion might not be relocated and would have a higher risk of being lost.

Relocating nests to designated relocation areas (some up to 1 mile long) on South Core Banks and North Core Banks also protects these nests from ORV and light pollution impacts; ORVs, camping, and beachfires are prohibited from these areas during the time that there are closures. Relocation does have some negative impacts. Six hours after deposition, the egg embryo becomes attached to the top of the eggshell. After this the embryo is very sensitive to movement, and can be dislodged if the egg is rotated. This would result in death of the embryo. If nesting pits were not constructed properly they can lead to loss of hatchlings as well. Relocating nests into a single beach closure also can increase the risk of a large loss due to storms, pathogens, or predation. However, relocating nests at the seashore has been very successful to date, achieving successful hatching rates since 1990 similar to those for non-relocated nests, 66% and 67% respectively (Cordes and Rikard 2004).

Relocating nests higher up on the beach could alter the natural sex ratio of hatchlings by altering the incubation temperature. Temperatures warmer than 84.6°F produce more females, while colder temperatures produce more males. Because North Carolina is near the northern limit of loggerhead nesting, it is believed that North Carolina contributes more males to the population. By relocating nests from lower on the beach to areas higher on the beach where incubation temperatures would presumably be slightly higher, more females could be produced than would naturally occur. Currently there is not enough conclusive data to determine if sex ratios are being altered.

Closing designated relocation areas along North Core Banks and South Core Banks to ORV traffic before the hatching of the first relocated nest would provide benefits for any turtles that come ashore in those areas to nest by eliminating potential disturbance from ORVs that might cause false crawls. This would be particularly true in the area south of the lighthouse on South Core Banks where the relocation area overlaps an area that generally receives the highest annual concentration of natural nests (see figure 8 in the “Affected Environment” chapter).

Under alternative A, all nests would be protected from predation by placing wire screens anchored by rebar over the nest. In past years the highest rate of predation, primarily by raccoon, has occurred on South Core Banks south of the lighthouse. In this location, nests would be afforded greater protection by placing wire cages over the nests. Using predator exclosures would entail a slight risk of damaging eggs during placement, and might result in partial or full nest losses if a predator learns to hunt for them. However, nest exclosures have been successful in decreasing the number of nests depredated by raccoons from 28 in 2000 to zero in 2004.

In the event of a hurricane, beaches would not be reopened to recreation until all existing turtle nests were found and remarked and closures reestablished. This would help prevent nests from being impacted by ORVs or other recreational activities.

Sea turtle nesting habitat overlaps protected bird species and seabeach amaranth habitat seaward of the primary dune line. Therefore, management for these species under alternative A would also be beneficial to sea turtles and their habitat. However, the extent to which the bird and seabeach amaranth management practices and closures are beneficial to the turtles would be dependent on the location, size, and duration of the closures. The management of these other protected species may affect / is not likely to adversely affect sea turtles.

While management under alternative A would provide overall benefits to the sea turtles, some risk of incidental take would still exist and, therefore, management activities may affect / are likely to adversely affect sea turtles.

Recreation Use. Sea turtles nest along all stretches of the seashore's beaches, and although the process of nest site selection is not well understood and there is a lack of data describing the characteristics of nesting sites at the seashore, ORV use may affect the beach profile and substrate characteristics in a way that reduces suitability for nesting and hatching success. Vehicle traffic on beaches contributes to erosion, especially during high tides or on narrow beaches, where driving is concentrated higher up on the beach, which may make some areas unsuitable for nesting (NMFS and USFWS 1991a). Vehicles leave ruts in the sand, and although ORV closures are erected 50 days into the nest incubation period, closure violations may occur, and any remaining ruts can trap hatchlings attempting to reach the ocean (Hosier et al. 1981). In areas of the seashore closed to ORV use, these impacts would be eliminated. In other areas that are closed temporarily such as turtle nest relocation areas and other protected species closures, these impacts would be reduced.

Under alternative A night driving would be allowed to continue within the seashore, and the presence of ORVs on the beach at night could disturb adult females potentially causing them to abort nesting attempts, disorienting hatchlings through light pollution or running them over, or harming live stranded turtles. Since 1997, an average of 47% of all turtle activity each year has been false crawls (aborted nesting attempts), though it is not known how many false crawls were directly attributable to ORVs. Under normal, undisturbed conditions there is generally a one to one ratio between the number of false crawls and the number of nests in a given area (Godfrey 2005a). From 1997 to 2005 the ratio at the seashore has averaged 1:1.1, ranging from 1:1.8 in 1997 to 1.6:1 in 2004. In 2005 the ratio was 1.2:1. Schofield (1995) showed a weak positive correlation between an increase in the number of vehicles operating at night at the seashore and increases in the number of false crawls. At the time the study was conducted in 1994, nighttime vehicle use was relatively low, with 4 to 13 vehicles using the ocean beach on South Core Banks during the nesting season. It is not known if nighttime use has increased since 1994. A visitor use study by East Carolina University scheduled to begin in 2006 would examine nighttime ORV use in the seashore. While turtles may attempt to nest again in the same night after a false crawl or on subsequent nights, causing a turtle to abort a nesting attempt is considered an incidental take under Section 7 of the Endangered Species Act, and it may cause the turtle to nest in another location that is less optimal (Schofield 1995).

Emerging hatchlings primarily use light cues such as a brighter horizon to find and move towards the sea; however, the headlights from ORVs driving on the beach at night can disorient hatchlings, which can lead to exhaustion and an increased risk of predation or desiccation (drying out). The 2-foot plywood light barriers erected around active nests would decrease this impact, but would not eliminate it. Due to the remote undeveloped nature of the seashore and limited amount of night driving, relatively few artificial-light impacts on hatchlings have been documented, with only nine incidences since 1997. There were an additional four incidences where hatchlings crawled inland, but these were in areas relatively free from

light pollution and were attributed to hatchlings being confused by the topography. There is also a slight risk that vehicles could strike and either hurt or kill nesting or live stranded turtles.

The seashore's jurisdiction extends 150 feet into the water on the soundside and boats are allowed to come ashore. From 1990 to 2004 there has been an average of 63 turtle strandings at the seashore. Species that have been documented include all three species that nest at the seashore as well as Kemp's ridley and one dead hawksbill in 2003. Most live and dead strandings are caused by hypothermia; however, from 1997 to 2004 an average of three stranded turtles had scars from boat propellers. It is not known if the propeller scars came from boats operating within the seashore's jurisdictional waters. With continued boat access to the seashore under alternative A, the possibility that boats operating within jurisdictional waters would hit and potentially kill a sea turtle would remain.

Prohibiting camping and beachfires in the nest relocation areas when the ORV closures go into effect would help protect hatchlings and nesting turtles in those areas from artificial light pollution; however, throughout the rest of the seashore these activities would not be prohibited and could contribute to false crawls in nesting adults or disorientation in hatchlings. Beachfires can also pose a hazard to nesting turtles and hatchling through the debris (smoldering lumber, cans, nails, broken bottles etc.) that is often associated with them. These additional hazards associated with beachfires would be eliminated in the nest relocation areas; however, they would still exist throughout the rest of the seashore. Encouraging concessionaires to minimize light use would help minimize light pollution on the beach. The extensive backroad system throughout the seashore also helps to minimize light pollution on the beach by allowing vehicles to drive behind the primary dune line rather than along the shoreline.

Recreation use can also lead indirectly to a greater number of predators within the seashore. Trash and improperly disposed of bait and fish carcasses can attract raccoons and bird predators to the beach where they may find and depredate turtle nests or hatchlings.

While management and law enforcement practices would help to minimize the impacts of recreation, recreation use within the seashore would still result in incidental takes of sea turtles and thus may affect/is likely to adversely affect all protected species of sea turtles in the seashore.

Other Seashore Management. The public outreach that would be continue to be provided under alternative A would be beneficial to the sea turtles providing the public information as to the specific needs of the species and alerting them ahead of time to areas where they cannot go due to potential impacts on the species. Therefore, public outreach under alternative A may affect / is not likely to adversely affect all species of sea turtles.

Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A would be the same as identified for piping plover. Because night enforcement is staff intensive and would heavily impact time available for day enforcement, regularly scheduled nighttime enforcement activities would not occur under alternative A. Compliance would have no effect or provide beneficial impacts on piping plover and thus would affect / are not likely to adversely affect sea turtles.

Other seashore management includes research efforts ongoing within the seashore. One such effort includes an evaluation of the consequences of predator removal for endangered species management. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the sea turtle nesting. Overall, the predator removal study could have beneficial impacts on sea turtles because results from the study may result in the eventual removal or reduction of predators from the seashore, thus benefiting sea turtle nesting success. Therefore, research efforts at the seashore may affect / are not likely to adversely affect all species of sea turtles.

Cumulative Impacts

Other past, current, and future planned actions within and around Cape Lookout National Seashore have the potential to impact the populations of all three species of sea turtles that regularly nest at the seashore. The dredging of Beaufort Inlet and Oregon Inlet to the north has occurred in the past and would continue to occur in the future. Details of the dredging operations are not known, but if a hopper dredge is used, especially during nesting season when more turtles are present, it may affect / is likely to adversely affect sea turtles. Hopper dredges are historically known to be responsible for incidental takes of sea turtles.

Commercial fishing is not allowed at the seashore, though it does occur at Cape Hatteras National Seashore and throughout the state of North Carolina and its jurisdictional waters. It may affect / is likely to adversely affect sea turtle populations within the seashore and the state as a whole. Commercial fishing, whether it be from shore or boat may result in the incidental take of sea turtles as they can get hooked or entangled in fishing line and nets. Sea turtles can also be injured or killed by propeller strikes from commercial fishing boats.

Limited concessionaire services are offered, and would continue to be offered, at Cape Lookout National Seashore and have a long-term negative impact on sea turtles. Services offered include a beach shuttle service and cabin rentals. There are also two vehicle/passenger ferries that enable the public to transport their vehicles to South Core Banks and North Core Banks. These services provide access to the seashore for day and overnight use and substantially increase the level of recreation use that occurs at the seashore.

Past storms such as hurricanes and other weather events during the turtle nesting and hatching season (April through November) have impacted turtle nesting success within the seashore and throughout the state of North Carolina. These storms, depending upon their intensity can result in partial or complete nest loss due to frequent flooding of nests, exposing nests due to erosion, or burying nests under feet of sand. Sea turtles have developed nesting strategies (e.g., laying lots of eggs and nesting several times during a season) to compensate for catastrophic natural events, so these impacts would be short-term may affect/is likely to adversely affect sea turtles. Storms have also altered the beachscape in both positive and negative manners. In some areas storms cause beach erosion, which has made those areas less optimal for nesting, while in other areas the storms have created overwash areas that create new nesting habitat. Weather events such as cold fronts can also cause sudden drops in ocean and soundside water temperatures, which can cause hypothermia and killing sea turtles. Hurricanes can also affect sea turtles because of their impact on staff resources. Recovery efforts that pull staff from resource management (and presumably surveying) activities during sea turtle nesting and hatchling season may affect / are likely to adversely affect sea turtles by causing nests to be missed due to a lack of surveying.

Several NPS past, current, and future planning efforts could also affect the sea turtles. The outcome of the current action to develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA could have long-term impacts on the nesting populations of all three species of sea turtles. However, whether the impacts of the interim strategy would be beneficial or adverse would depend on the management decisions that are made and ultimately implemented. Other future planning efforts include the development of long-term ORV management plan/EISs for both Cape Lookout National Seashore and Cape Hatteras National Seashore, which would have direct, long-term impacts on the nesting sea turtle populations within the seashore as well as within the state of North Carolina. Specifically, it could have an impact on the State's goal of achieving 800 loggerhead nests annually within the state for a period of 25 years per the Loggerhead Recovery Plan. However, whether the impact of the long-term ORV management plans/EISs would be beneficial or adverse to sea turtles would depend on the management decisions that are made and ultimately implemented.

In the future the seashore would develop a Comprehensive Interpretation Plan that would further articulate the seashore's purpose, significance and themes. It is necessary to inform/guide the seashore's interpretive and education programs, which includes information about threatened and endangered species within the seashore, and would have beneficial long-term impacts on the sea turtles.

A population of culturally important feral horses exists on Shackleford Banks. Both the NPS and the Foundation of Shackleford Horses maintain the population through a horse management plan that defines how the population is cooperatively managed. Part of the management calls for the population to be maintained at a predescribed level so that it does not get too large. The horses are generally found on the dunes, in the swales between the dunes, on the marsh or in the forest. To the extent that they roam on the beaches, they could negatively impact turtle nests, but the risk would be minimal, as the horses do not frequent these areas.

The overall cumulative impact of these past, current and future actions, added to the effects of the actions outlined under alternative A, may affect / are likely to adversely affect sea turtles within the Cape Lookout National Seashore and the state of North Carolina as a whole.

Conclusion

While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative A. Therefore, overall the actions taken under alternative A may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Impacts on sea turtles under alternative B would be similar to alternative A, but the number of undetected nests would likely be reduced. Expanding the daily surveying period from May 1 to August 31 would encompass the typical loggerhead nesting season except for the occasional rare nest laid after August. However, similar to alternative A, staff patrolling the beaches for other surveying reasons would likely detect nests laid before or after this time frame. Increasing the surveying of Shackleford Banks to 3 to 4 days per week would also likely reduce the number of missed nests, for there would be less time between surveys for pedestrian traffic, blowing sand, or rain to obscure crawl tracks.

While surveying activities under alternative B would provide many benefits, there would be only a slight risk that nests may go undetected and potentially result in disturbance. Therefore, the surveying activities under alternative B may affect / are not likely to adversely affect all species of sea turtles.

Under alternative B the types of impacts would be similar to alternative A; however, the overall impact and number of incidental takes of sea turtles due to management practices would be reduced. Establishing a 30 feet by 30 feet full recreational closure around all nests would enhance the protection of a nest from ORV and other recreation use. Under this alternative, pets would be restricted from the seashore from April 15 through August 31. This closure size, in conjunction with seasonal pet restrictions, would also decrease the likelihood that a nest would be directly impacted should an ORV, pedestrian, and/or their pet violate the closure area.

Similar to alternative A, relocating nests laid in areas prone to erosion or frequent flooding by tides would have both beneficial and negative impacts. However, under alternative B, all nests laid in areas prone to frequent flooding or erosion would be relocated to one of the relocation areas on North Core Banks or South Core Banks, or to more suitable habitat on Shackleford Banks. This would greatly reduce the risk of losing nests to frequent flooding or erosion. Impacts for all other management activities would be the same as under alternative A.

Other species management occurring at the seashore would impact sea turtles as well. Sea turtle nesting habitat overlaps protected bird and seabeach amaranth habitat seaward of the primary dune line.

Protection measures for these species are enhanced under alternative B (e.g., the northern 2 miles of South Core Banks would be subject to a full recreational closure from the time a protected bird species nest hatches until the last chicks have fledged or confirmed lost as compared to alternative A and would provide a greater benefit to sea turtles and their habitat as well. Similar to alternative A, the extent to which they would be beneficial to the turtles would be dependent upon the location, size, type, and duration of the closures. The management of these other protected species may affect / is not likely to adversely affect sea turtles.

Overall, surveying and management practices under alternative B would provide greater benefits to the sea turtles than alternative A, but there would still be some risk of incidental take. Therefore surveying and management may affect / is likely to adversely affect sea turtles.

Recreation Use. Under alternative B, the overall impact and number of incidental takes of sea turtles would be reduced by closing more areas of the seashore to ORVs during the turtle nesting season. In addition to the areas closed under alternative A, the northern 2 miles of South Core Banks would be seasonally closed to recreation use and Middle Core Banks and “Ophelia Banks” would also be closed to ORVs (mainly ATVs) during the turtle nesting season from April 1 to August 31. In addition, the pets would be prohibited from entering the seashore from April 15 through August 31. This would provide beaches free of disturbance for turtles nesting in these areas. It would also eliminate impacts on hatchlings making their way to the ocean during this time frame. Hatchlings from nests laid after June would also be subject to impacts as incubation periods in North Carolina generally average between 63 and 68 days (NMFS and USFWS 1991a), meaning the hatchlings would emerge from their nests after August 31.

On an annual basis the area between mile markers 41 and 44 generally has the highest concentration of nesting activity (see figure 8 in the “Affected Environment” chapter), and had as many as 64 nests in 1999. Under alternative B this area would be closed to all night driving from May 1 until after the last nest has hatched. Turtle nesting and hatching occurs almost exclusively during nighttime hours. Prohibiting night driving in this area during the turtle nesting and hatching season would provide substantial protection to nesting turtles from being disturbed by ORVs and to hatchlings from being run over or disoriented by ORV headlights. Encouraging vehicle operators to use the backroads behind the primary dune line throughout the rest of the seashore would also help to reduce the amount of light pollution on the beach and provide additional protection for nesting turtles and hatchlings. Prohibiting camping and beachfires within 600 feet of a turtle nest would also reduce the impacts of light pollution on hatchlings.

Increasing the number of natural resource and law enforcement staff and conducting patrols at night would increase public compliance with closures and other seashore regulations (e.g., leash laws, trash disposal, and bait and fish carcass disposal). This would reduce the number of potential impacts on nesting turtles, nests, and hatchlings.

While the additional management and law enforcement practices under alternative B would reduce the impacts of recreation, recreation use within the seashore would still result in some incidental takes of sea turtles through false crawls and potential impacts from light pollution among other things. Therefore recreation use may affect / is likely to adversely affect all protected species of sea turtles in the seashore.

Other Seashore Management. Outreach activities would be similar to alternative A, but would include law enforcement rangers stationed at the Long Point and Great Island ferry landings 4 days per week, 10 hours per day to relay educational information about protected species management closures. These outreach activities would benefit all protected species and therefore may affect / are not likely to adversely affect sea turtles.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, as identified under the alternative B for piping plover. Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have beneficial impacts on piping plover and thus would affect / are not likely to adversely affect sea turtles.

Other seashore management includes research efforts ongoing within the seashore, as detailed under alternative A. One such effort includes an evaluation of the consequences of predator removal for endangered species management. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the sea turtle nesting. Overall, the predator removal study could have beneficial impacts on sea turtles because results from the study may result in the eventual removal or reduction of predators from the seashore, thus benefiting sea turtle nesting success. Therefore, research efforts at the seashore may affect / are not likely to adversely affect all species of sea turtles.

Cumulative Impacts

Cumulative impacts on sea turtles under alternative B would be very similar to those described for alternative A. Although alternative B does provide some additional protection, the adverse effects on sea turtles from other actions occurring in the region would still exist. Therefore, the effects of these other actions, added to the effects of actions under alternative B, may affect / are likely to adversely affect sea turtles on a regional basis.

Conclusion

Though surveying and management activities could greatly reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative B. Therefore the actions taken under alternative B may affect / are likely to adversely affect sea turtles. Past, current, and future activities both inside the seashore and within the state of North Carolina, when combined with the impacts of recreation use, surveying, and management of the species may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Survey and management would be the same as proposed under alternative A and, thus, impacts under alternative C may affect / are likely to adversely affect all species of sea turtles.

Recreation Use. Under alternative C, the overall impact and number of incidental takes of sea turtles would be reduced compared to alternative A, but not as much as alternative B. Similar to alternative B, more areas of the seashore would be closed to ORVs during the turtle nesting season. In addition to the areas closed under alternative A, Middle Core Banks and “Ophelia Banks” would be closed to ORVs during the turtle nesting season from April 1 to August 31. This would provide beach areas free of tire ruts, reducing impacts on hatchlings making their way to the ocean during this time frame. Hatchlings from nests laid after June would be subject to impacts as incubation periods in North Carolina generally average between 63 and 68 days (NMFS and USFWS 1991a), meaning the hatchlings would emerge from their nests after August 31 and the removal of many ORV closure areas.

Aside from the aforementioned differences, all other impacts would be similar to alternative A, for there would be no special regulations on night driving, and camping and beachfires would be allowed

throughout the seashore except in the turtle nest relocation areas. Therefore, recreation use may affect / is likely to adversely affect all protected species of sea turtles in the seashore.

Other Seashore Management. Outreach activities would be similar to alternative A, but would include law enforcement rangers stationed at the Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay educational information about protected species management closures. These outreach activities would benefit all protected species and therefore may affect / are not likely to adversely affect sea turtles.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, as identified under the alternative C for piping plover. Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have beneficial impacts on sea turtles and would affect / is not likely to adversely affect sea turtles.

As in alternative A, other seashore management includes research efforts ongoing within the seashore. One such effort includes an evaluation of the consequences of predator removal for endangered species management. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the sea turtle nesting. Overall, the predator removal study could have beneficial impacts on sea turtles because results from the study may result in the eventual removal or reduction of predators from the seashore, thus benefiting sea turtle nesting success. Therefore, research efforts at the seashore may affect / are not likely to adversely affect all species of sea turtles.

Cumulative Impacts

Cumulative impacts on sea turtles under alternative C would be very similar to those described for alternative A. Although alternative C does provide some additional protection, the adverse effects on sea turtles from other actions occurring in the region would still exist. Therefore, the effects of these other actions, added to the effects of actions under alternative C, may affect / are likely to adversely affect sea turtles on a regional basis.

Conclusion

Though additional full recreational closures, camping and light restrictions, and increasing compliance with closures and other regulations would reduce impacts on sea turtles, there would still be a risk that some adult turtles may be killed or caused to abort nesting attempts, unidentified nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use would have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative C. Therefore actions taken under alternative C may affect / are likely to adversely affect all species of sea turtle. Past, current, and future activities both inside the seashore and within the state of North Carolina, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Procedures for surveying and management of sea turtle nests under alternative D would be the same procedures as under alternative A. Therefore the impacts would be the same and may affect / are likely to adversely affect all species of protected sea turtles.

Sea turtle nesting habitat overlaps protected bird species and seabeach amaranth habitat seaward of the primary dune line. Therefore management for these species under alternative D would also be beneficial

to sea turtles and their habitat. However, the extent to which the bird and seabeach amaranth management practices and related ORV and/or full recreational closures are beneficial to the turtles would be dependent on the location, size, type, and duration of the closures. The management of these other protected species may affect / is not likely to adversely affect sea turtles.

Recreation Use. In addition to prohibiting ORVs from Shackleford Banks, Portsmouth Flats, the beach between mile markers 41A and 41B, the interior of Cape Lookout Point, and Power Squadron Spit (same to alternative A), ORVs would be prohibited from Middle Core Banks and “Ophelia Banks” during the turtle nesting season from April 1 to August 31. This would reduce impacts on hatchlings making their way to the ocean during this time frame. Hatchlings from nests laid after June would also be subject to impacts as incubation periods in North Carolina generally average between 63 and 68 days (NMFS and USFWS 1991a), meaning the hatchlings would emerge from their nests after August 31. All other impacts from recreation use would be the same as under alternative A and may affect/are likely to adversely affect all species of sea turtles.

Other Seashore Management. Outreach activities would be similar to alternative A, but would include interpretation staff stationed at the Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay educational information about protected species management closures. These outreach activities would benefit all protected species and therefore may affect / are not likely to adversely affect sea turtles.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, as identified under the alternative A for piping plover. Compliance activities may affect / are not likely to adversely affect sea turtles.

As in alternative A, other seashore management includes research efforts ongoing within the seashore. One such effort includes an evaluation of the consequences of predator removal for endangered species management. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the sea turtle nesting. Overall, the predator removal study could have beneficial impacts on sea turtles because results from the study may result in the eventual removal or reduction of predators from the seashore, thus benefiting sea turtle nesting success. Therefore, research efforts at the seashore may affect / are not likely to adversely affect all species of sea turtles.

Cumulative Impacts

Cumulative impacts on sea turtles under alternative D would be very similar to those described for alternative A. Although alternative D does provide some additional protection, the adverse effects on sea turtles from other actions occurring in the region would still exist. Therefore, the effects of these other actions, added to the effects of actions under alternative D, may affect / are likely to adversely affect sea turtles on a regional basis.

Conclusion

While surveying and management activities would reduce the impacts to nesting sea turtles and hatchlings, adult turtles may still be killed or caused to abort nesting attempts, nests may be run over or disturbed in other manners, and hatchlings may be run over or disoriented by light pollution. ORV and other recreational use have both direct and indirect impacts on nesting sea turtles and hatchlings within the seashore under alternative D. Therefore, overall the actions taken under alternative D may affect / are likely to adversely affect sea turtles. Past, current, and future activities both within the seashore and within the state of North Carolina, when combined with the impacts of surveying and management of the species and recreation use at the seashore, would continue to result in impacts that may affect / are likely to adversely affect the sea turtles. Impairment of sea turtles would not occur under alternative D.

SEABEACH AMARANTH

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on seabeach amaranth populations and habitat at Cape Lookout National Seashore were evaluated based on the species' life history, its past and present occurrence at the seashore, as well as known effects on the species from activities relating to humans, pets, predators, and ORVs. Information on habitat and other existing data were acquired from seashore staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature. Methods to analyze impacts on seabeach amaranth use alternative A as the baseline condition against which the action alternatives are compared.

The analysis focuses on impacts on seabeach amaranth from a variety of human recreational activities, as well as impacts incurred during surveying and management activities. Seabeach amaranth often grows in habitat areas used by other protected species within the seashore such as piping plovers, American oystercatcher, colonial waterbirds, and sea turtles. Therefore any closures established to protect the habitat or nests of these species would also be beneficial to seabeach amaranth, though the extent of the benefit would be dependent on the actual location, size, type, and duration of the closures. It is also assumed that increases in law enforcement staff and patrols at the seashore would result in greater public compliance with closures and other seashore regulations (e.g., leash laws) than currently exists.

Study Area

The study area for assessment of the various alternatives is the seashore. The study area for the cumulative impacts analysis is the entire habitat range for seabeach amaranth, which includes nine coastal states from Massachusetts to South Carolina.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Before late-July or early-August when an intensive annual survey of plants is conducted, suitable habitat is not surveyed for seabeach amaranth. Seedlings are generally first visible at the seashore in June; however, without surveying during this period it is likely that plants would not be detected, and only those plants that germinate within a closure established for bird or sea turtle protection or other area closed to ORV traffic (Shackleford Banks, Portsmouth Flats, interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit) would be afforded any protection from ORVs.

Seabeach amaranth is an annual whose seeds are viable for long periods of time and can be dispersed long distances by wind and water, allowing it to occupy newly created habitat. Seeds may also just accumulate around the base of a plant when it dies, allowing it to continue to occupy currently available habitat. Therefore, to protect and maintain this species, it is necessary to protect the plants and habitat where they now occur and potential habitat where plants might eventually occur, as well as unknown sites where seeds might be (Jolls et al. 2004).

Under alternative A there would be no management specifically targeting seabeach amaranth habitat. However, two areas where seabeach amaranth has been historically found in the seashore, Shackleford Banks and Power Squadron Spit, would be closed to ORV traffic, thus affording protection to the plant (see "Recreation Use" below). Seabeach amaranth habitat also overlaps that of the piping plover and other protected bird species within the seashore, so the plant's habitat would be afforded protection by any protected species management closures established for the protection of these species as well. Outside of these closures, any areas where seeds are dispersed into habitat open to ORV traffic may be destroyed or buried to depths beyond which they can germinate.

During the annual survey any plants found outside of closed areas that are open to ORV use would be protected by delineating a minimum buffer of 20 feet and established an associated ORV closure, based

on best professional judgment. This ORV closure should be sufficient to protect the plants from ORV related impacts, including erosion.

Due to the risk that seabeach amaranth plants and seeds may be negatively impacted in areas not closed to ORV traffic, species management may affect / is likely to adversely affect seabeach amaranth.

The primary habitat of seabeach amaranth overlaps that of piping plover, American oystercatcher, and other protected bird species at the seashore. Under alternative A, the prior season's nesting habitat for piping plovers and colonial waterbirds would be closed to all recreation in April of each year, therefore, providing protection for seabeach amaranth seedlings that germinate within these areas during the time of bird nesting activities.

Webworms (caterpillars of small moths) feed on the leaves of seabeach amaranth, and if prolific enough, can defoliate the plants to the point of either killing them or reducing their seed production. Alternative A would not provide any actions to remove the webworms, if found, from the plants. Predation (herbivory) by webworms is a major source of mortality and lowered fecundity of seabeach amaranth in the Carolinas (USFWS 1996b).

Beach vitex, a non-native species originally introduced to South Carolina from Korea, has not been documented in the seashore yet; however, as of 2005, it has migrated from South Carolina to as far north as Atlantic Beach, North Carolina (Carolinas Beach Vitex Task Force 2005). Although not classified as an invasive species yet, it is a fast spreading plant that grows in similar habitats and out-competes seabeach amaranth. Under alternative A, there would be no management plan for this species should it be found within the seashore. Without management policies for webworms and beach vitex, these species could have negative impacts on the seabeach amaranth population; therefore, these other management practices may affect / are likely to adversely affect seabeach amaranth.

Recreation Use. Historically, the majority of seabeach amaranth plants within the seashore have been found on the southfacing beaches of Shackleford Banks and the area between Cape Point and Power Squadron Spit. ORVs are not prohibited on Shackleford Banks, Power Squadron Spit, the interior of Cape Lookout Point, Portsmouth Flats, and on the beach between mile markers 41A and 41B, so seabeach amaranth is protected from ORV impacts in these areas, and additional closures are not established around the plants. While these areas receive pedestrian traffic, not erecting closures around the plants would not create much of a hazard for the plants. Pedestrian use of beaches typically does not overlap heavily with the habitat of seabeach amaranth, as joggers prefer wet sand and sunbathers prefer to be closer to the water. Pedestrian traffic during the dormant season would be much less than during the growing season and would not likely have any impacts on the species. Even during the growing season, pedestrian traffic would generally have little effect on seabeach amaranth populations, as many beaches with daily use by thousands of sunbathers, joggers, and other recreation enthusiasts have substantial and apparently healthy populations of seabeach amaranth (USFWS 1996b). However, there would still be a slight risk that some undetected/unprotected seedlings/plants could be trampled by pedestrians and or their pets, specifically by those who tent camp near the toe of the dunes.

In areas open to ORV traffic any unprotected plants, especially before the annual survey, may be crushed. Impacts on seabeach amaranth may also occur due to the lack of established year-round ORV closures in all seabeach amaranth habitat. During the plant's dormant season (December to April), habitat where seeds may germinate would not be protected from ORV traffic, and seeds may be pulverized or buried to a depth beyond which they can germinate. However, there would be some benefits. Seabeach amaranth is intolerant of competition from other plants, and winter ORV traffic would help prevent the widespread establishment of perennial grasses and shrubs on the overwash sand flats, which would render the habitat unsuitable for seabeach amaranth (USFWS 1996b).

Due to the potential negative impacts on seabeach amaranth detailed above, recreation use may affect / is likely to adversely affect seabeach amaranth.

Other Seashore Management. Informational brochures provided in the visitor center would include information about seabeach amaranth; however, there would be no other education or public outreach specifically for the plant. Although this would not provide any benefits to the species, impacts related to outreach efforts, or a lack thereof, would not be measurable; therefore, this may affect / is not likely to adversely affect seabeach amaranth.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on seabeach amaranth habitat. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect seabeach amaranth.

Cumulative Impacts

Other past, current, and future planned actions within and around Cape Lookout National Seashore have the potential to impact seabeach amaranth. The dredging of Beaufort Inlet has not and would not impact seabeach amaranth within the seashore; however, the dredging of channels in and around barrier islands occurs throughout the plant's range along the eastern seaboard of the U.S. and may adversely affect the plant. While the actual dredging does not impact the plant, some heavy equipment often accesses the inlets/channels via the spits of the barrier islands. Such is the case in the dredging of Oregon Inlet at Cape Hatteras National Seashore. Depending on the level of protection afforded the plant where the dredging is taking place, this equipment may affect / is likely to adversely affect seabeach amaranth by pulverizing or burying seeds or by running over seedlings or plants.

Limited concessionaire services are offered and would continue to be offered at Cape Lookout National Seashore and have long-term negative impacts on seabeach amaranth. Services offered include a beach shuttle service and rental cabins. There are also two vehicle/passenger ferries that enable the public to transport their vehicles to South Core Banks and North Core Banks. These services provide access to the seashore for both day and overnight use and substantially increase the amount of recreation use that occurs at the seashore.

Past storms such as hurricanes and other weather events have impacted seabeach amaranth within the seashore and throughout the plant's habitat range both adversely and beneficially. Seabeach amaranth is extremely susceptible to overwash, and strong storms can cause overwash in areas even at the toe of the dunes. If a storm occurs early enough in the growing season it can destroy plants before them setting seed. Storms can bury seeds to a depth below which they can germinate. However, storms can also uncover previously buried seed banks, bringing them back to a depth where they can then germinate. Storms play a major role in dispersing seeds through both wind and water, and can reestablish populations in areas that had become devoid of plants. Storms can destroy habitat through erosion or create new habitat by creating overwash areas. Hurricanes can affect seabeach amaranth because of their impact on staff resources. Recovery efforts that pull staff from resource management (and presumably surveying) activities may affect/are likely to adversely affect seabeach amaranth by causing plants to be missed and therefore go unprotected.

Several NPS past, current, and future planning efforts can also affect the sea turtles. The outcome of the current action to develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA could have long-term impacts on seabeach amaranth populations within Cape Lookout National Seashore and throughout the rest of the plant's habitat range. Populations of seabeach amaranth in the south are probably sources of long distance seed dispersal due to the fact that storms move northward along the U.S. Atlantic seacoast. Thus, Cape Lookout National Seashore could be a potential seed source for suitable habitat in nearby Cape Hatteras National Seashore and in areas to the north.

However, whether the impacts of the Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA would be beneficial or adverse depends on the management decisions that are made and ultimately implemented. Other future planning efforts include the development of long-term ORV management plan/EISs for both Cape Lookout National Seashore and Cape Hatteras National Seashore. These plans would address ORVs, and because of the documented risks that ORVs pose to seabeach amaranth, these plans would have long-term, direct impacts on seabeach amaranth at Cape Lookout National Seashore and indirect impacts throughout the plant's range if Cape Lookout National Seashore or Cape Hatteras National Seashore act as potential seed sources for long distance dispersal of the plant. However, the impacts on seabeach amaranth are indeterminate at this time and would depend on the policies developed with regards to where within the seashore ORVs would be allowed to go and during what time of year.

In the future the seashore would develop a Comprehensive Interpretation Plan that would further articulate the seashore's purpose, significance, and themes. It is necessary to inform/guide the seashore's interpretive and education programs, which includes information about threatened and endangered species within the seashore, and would have positive long-term impacts on the seabeach amaranth.

A population of culturally important feral horses exists on Shackleford Banks. The population is maintained through a horse management plan that defines how the population is cooperatively managed by both the NPS and the foundation of Shackleford Horses. Part of the management calls for the population to be maintained at a predescribed level so that it does not get too large. The horses are generally found on the dunes, in the swales between the dunes, on the marsh or in the forest. To the extent that they roam on the beaches in habitat where seabeach amaranth is found, they could adversely impact seabeach amaranth by crushing plants and burying seeds.

The overall cumulative impacts of these past, current and future actions, in combination with the effects of alternative A, may affect / are likely to adversely affect seabeach amaranth within the Cape Lookout National Seashore and throughout the plant's habitat range.

Conclusion

Surveying and management activities still provide the risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative A. Therefore the overall impacts of actions taken under alternative A may affect / are likely to adversely affect the seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying and management of the species expected under this alternative would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. There would be no impairment of seabeach amaranth would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Identifying all potential habitat (historic and current populations within the past 3 years) and surveying it one to two times per week beginning when seedlings are typically first visible in June would be beneficial, documenting and protecting plants that might otherwise be destroyed by ORVs, pedestrians, or natural events (i.e., storm overwash) before the annual survey in August. Documenting the location of these plants would result in the habitat where they are located being protected as potential habitat (i.e., historic or extant) at the beginning of the next growing season. This would enhance the chances that the seabeach amaranth population would increase within the seashore.

Seabeach amaranth habitat overlaps that of the protected bird and turtle species within the seashore and may germinate within the ORV and/or full recreational closures established for these species. Surveying

these closures for seabeach amaranth before reopening them to ORV and other recreation use and establishing buffers around plants if needed would protect any plants that exist within these areas.

Despite surveying efforts, there would remain a small probability that plants would be missed and subsequently crushed by ORVs or destroyed by natural causes. Seeds in areas open to ORV traffic would still be subject to impacts from ORVs. Therefore, species surveying activities may affect / are likely to adversely affect seabeach amaranth.

Under alternative B, protection of seabeach amaranth habitat, plants, and seeds would be enhanced by closing all potential habitat to ORV traffic from May 1 through the end of the growing season. Delineating a minimum 20-foot ORV closure around any plant found outside of an ORV or full-recreational closure in an area open to ORV use would protect the plant from ORV impacts, including erosion from multiple vehicle passes. However, seabeach amaranth can begin germinating as early as April. With surveying not beginning until June when seedlings are typically first visible and potential habitat not protected until May 1, any plants that begin germinating in April may be destroyed if they occur in areas open to ORV traffic.

Similar to alternative A, Shackleford Banks, Power Squadron Spit, the beach between mile markers 41A and 41B, Portsmouth Flats, and the interior of Cape Lookout Point would be closed to ORV traffic year round, thus protecting any seabeach amaranth habitat and/or plants that exist in these areas. In addition, the northern 2 miles of South Core Banks would be subject to a full recreational closure during most of the seabeach amaranth's growing season. Any plants found in these locations when they are reopened to ORV traffic or recreation use would be protected with smaller ORV closures, if needed.

In addition to the year-round ORV closures, additional seabeach amaranth habitat would be protected year round as a result of non-breeding season bird closures. However, some seabeach amaranth habitat would still be subject to ORV traffic during the plant's dormant season (December to April). In general, ORV traffic during the seabeach amaranth's dormant season would have some negative impacts including pulverizing and burying seeds. There could also be some negative impacts from protecting seabeach amaranth habitat during its dormant season as well. Seabeach amaranth is intolerant of competition from other plants, and in areas where ORV traffic is prohibited year round, the beach area would experience little disturbance and would continue through its successional stages with the establishment of perennial grasses and shrubs, which would render the habitat unsuitable for seabeach amaranth.

While management under alternative B provides a great deal of protection to seabeach amaranth habitat, seeds and plants, a slight risk of plant mortality and seed burial caused by ORVs would still exist. Therefore species management may affect / is likely to adversely affect seabeach amaranth.

The primary habitat of seabeach amaranth overlaps that of piping plover, American oystercatcher, and other protected bird species at the seashore. Similar to alternative A, the prior season's nesting habitat for piping plovers would be closed to all recreation beginning in April of each year. Active nesting areas for colonial waterbirds would also be closed to all recreational use in April, and would provide protection for seabeach amaranth seedlings, which germinate within these areas during the time of bird nesting activities. In addition, buffer sizes and the associated full recreational closures around nesting activities would be increased under alternative B, potentially helping to protect potential seabeach amaranth habitat that falls outside of the areas where the plant has existed during the previous 3 years. Some seabeach amaranth habitat would also be protected year round by closures involving key piping plover winter habitat. This would help protect any seeds that may be dispersed to these areas, but it could also allow these beach areas to continue through their successional stages with the establishment of perennial grasses and shrubs, which would render the habitat unsuitable for seabeach amaranth.

Similar to alternative A, no management plan would be in place for the removal of webworms or beach vitex. Without management policies for webworms and beach vitex, these species, if found in the

seashore, could have negative impacts on the seabeach amaranth population, therefore, other management practices may affect / are likely to adversely affect seabeach amaranth.

Recreation Use. Under alternative B seabeach amaranth would be afforded greater protection from recreation use than under alternative A by expanding the number of areas closed to ORV use. In addition to the areas closed year round under alternative A (Shackleford Banks, the interior of Cape Lookout Point, Power Squadron Spit, Portsmouth Flats, and the beach between mile markers 41A and 41B), Middle Core Banks and “Ophelia Banks” would be closed for a large portion of the seabeach amaranth’s growing season; April 1 to August 31. Two miles at the northern end of South Core Banks would also be closed to all recreation while piping plover chicks are present. These ORV closures would help protect any plants that might germinate in these areas. Before reopening these areas to vehicular traffic, buffers would be erected around plants if needed.

In areas outside of closures open to ORV traffic there would be a slight risk that a seedling/plant would be missed during surveying and go unprotected, potentially being crushed by an ORV. All other impacts from recreation would be similar to alternative A, though the slight risk of impacts from pedestrians would be further reduced by prohibiting tent camping within the seabeach amaranth closures.

Though management would greatly reduce the risk of impact from ORVs, there would still be a slight risk that seabeach amaranth plants/seeds would be crushed/buried in areas outside of closures that were open to ORV traffic, and there would still be a risk that plants may be impacted by pedestrians. Therefore recreation use may affect / is likely to adversely affect seabeach amaranth.

Other Seashore Management. Informational brochures provided in the visitor center would include information about seabeach amaranth, and information about protected species and management related ORV and full-recreational closures would be provided at the ferry landings 4 days per week. This would inform people about the susceptibility of seabeach amaranth to impacts from recreation use and may help to reduce impacts. This may affect / is not likely to adversely affect seabeach amaranth.

Research efforts ongoing within the seashore would be the same as detailed under alternative A. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect seabeach amaranth.

Cumulative Impacts

The overall cumulative impacts under alternative B would be similar to those described for alternative A. Although the impacts would be less than under alternative A due to the habitat and plant protection measures that would be enacted under alternative B, adverse impacts from other actions would still exist. Therefore, the impacts of these other actions, added to the impacts of actions under alternative B, may affect/are likely to adversely affect seabeach amaranth on a regional basis.

Conclusion

Though surveying and management activities would protect both the plant and its habitat, greatly reducing the recreational impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative B. Therefore the overall actions under alternative B may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant’s historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Surveying all potential seabeach amaranth habitat one to two times per week beginning when seedlings are typically first visible in June would be beneficial by documenting and protecting plants that might otherwise be destroyed by ORVs, pedestrians, or natural events (i.e., storm overwash) before the annual survey in August. Documenting these plants would result in the habitat where they were located being protected as potential habitat (i.e., historic or extant) at the beginning of the next growing season. This would enhance the chances that the seabeach amaranth population would increase within the seashore.

Seabeach amaranth habitat overlaps that of the protected bird and turtle species within the seashore and germinates within the full recreational and ORV closures for these species. Surveying these closures for seabeach amaranth before reopening them to ORV and other recreation use and erecting buffers around plants if needed would protect any plants that exist within these areas.

Despite surveying efforts, there would remain a small probability that plants would be missed and subsequently crushed by ORVs or destroyed by natural causes. Seeds in areas open to ORV traffic would still be subject to impacts from ORVs. Therefore, species surveying activities may affect / are likely to adversely affect seabeach amaranth.

Similar to alternative A there would be no management efforts specifically targeting seabeach amaranth habitat under alternative C. However, as detailed in alternative A the following areas would be closed to ORV traffic year round: Shackleford Banks, the interior of Cape Lookout Point, Power Squadron Spit, Portsmouth Flats, and the beach between mile markers 41A and 41B. Seabeach amaranth habitat and/or plants that exist in these areas would be protected. In addition, and similar to alternative B, the northern 2 miles of South Core Banks, Middle Core Banks, and “Ophelia Banks” would be closed to ORV use during most of the seabeach amaranth’s growing season. Any plants found in these locations when they are reopened to ORV traffic would be protected with vehicle closures if needed (see “Recreation Use” later in this section). Seabeach amaranth habitat also overlaps that of the piping plover and other protected bird species within the seashore, so the plant’s habitat would be afforded protection by any closures erected for the protection of these species as well (see “Other Management”). Outside of these closures, any areas where seeds are dispersed into habitat open to ORV traffic may be destroyed or buried to depths beyond which they can germinate.

Delineating a 30-foot ORV closure around any plant found outside of a closure in an area open to ORV use would protect the plant from ORV impacts, including erosion from multiple vehicle passes. However, seabeach amaranth can begin germinating as early as April. Without protecting potential habitat and surveying not beginning until June when seedlings are typically first visible, any plants that begin germinating in April or May may be crushed if they occur in areas open to ORV traffic.

In addition to the year-round ORV closures, some additional seabeach amaranth habitat would be protected year round as a result of non-breeding season bird closures. Some portions of seabeach amaranth habitat would still be subject to ORV traffic during the plant’s dormant season (December to April). In general, ORV traffic during the seabeach amaranth’s dormant season would have some negative impacts including pulverizing and burying seeds. There could also be some negative impacts from protecting seabeach amaranth habitat during its dormant season. Seabeach amaranth is intolerant of competition from other plants, and in areas where ORV traffic is prohibited year round, the beach area would experience little disturbance and would continue through its successional stages with the establishment of perennial grasses and shrubs, which would render the habitat unsuitable for seabeach amaranth.

While management under alternative C provides protection to seabeach amaranth habitat, seeds and plants, a slight risk of plant mortality and seed burial caused by ORVs would still exist. Therefore management may affect / is likely to adversely affect seabeach amaranth.

The primary habitat of seabeach amaranth overlaps that of piping plover, American oystercatcher, and other protected bird species at the seashore. Similar to alternative A, the prior season's nesting habitat for piping plovers would be closed to all recreation beginning in April of each year. Active nesting areas for colonial waterbirds would also be closed to all recreational use in April and provide protection for seabeach amaranth seedlings that germinate within these areas during the time of bird nesting activities. In addition, buffer sizes around nesting activities for some bird species would be increased under alternative C, and ramp to ramp ORV closures would occur when three or more American oystercatcher pairs display courtship or mating behavior, potentially helping to protect potential seabeach amaranth habitat. Some seabeach amaranth habitat would also be protected year round, for under alternative C all closures involving key piping plover winter habitat and the 2-mile vehicle closure at the north end of South Core Banks would be maintained throughout the non-breeding season. This would help protect any seeds that may be dispersed to these areas, but it could also allow these beach areas to continue through their successional stages with the establishment of perennial grasses and shrubs, which would render the habitat unsuitable for seabeach amaranth.

Similar to alternative A, there would be no management plan in place for the removal of webworms or beach vitex. Without management policies for webworms and beach vitex, these species, if found in the seashore, could have negative impacts on the seabeach amaranth population, therefore other management practices may affect/are likely to adversely affect seabeach amaranth.

Recreation Use. Under alternative C seabeach amaranth would be afforded greater protection from recreation use than under alternative A by expanding the number of areas closed to ORV use. In addition to the areas closed to ORV year round under alternative A, Middle Core Banks and "Ophelia Banks" would be closed for a large portion of the seabeach amaranth's growing season; April 1 to August 31. Two miles at the northern end of South Core Banks would also be closed to ORV while bird chicks were present. These ORV closures would help protect any plants that might germinate in these areas. Before reopening these areas to vehicular traffic, buffers would be erected around plants if needed.

In areas outside of closures that were open to ORV traffic there would be a slight risk that a seedling/plant would be missed during surveying and go unprotected, potentially being crushed by an ORV. All other impacts from recreation would be similar to alternative A, though the slight risk of impacts from pedestrians would be further reduced by prohibiting tent camping within the seabeach amaranth closures. A greater presence of law enforcement would also increase the public's compliance with all protected species closures, which would be beneficial to the seabeach amaranth.

Though management would greatly reduce the risk of impact from ORVs, there would still be a slight risk that seabeach amaranth plants/seeds would be crushed/buried in areas outside of closures that were open to ORV traffic. Therefore recreation use may affect / is likely to adversely affect seabeach amaranth.

Other Seashore Management. Informational brochures provided in the visitor center would include information about seabeach amaranth, and information about protected species and management related ORV and full-recreational closures would be provided at the ferry landings 7 days per week. This would inform people about the susceptibility of seabeach amaranth to impacts from recreation use and may help to reduce impacts. This may affect / is not likely to adversely affect seabeach amaranth.

Research efforts ongoing within the seashore would be the same as detailed under alternative A. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect seabeach amaranth.

Cumulative Impacts

The overall cumulative impacts under alternative C would be similar to those described for alternative A. Although the impacts would be less than under alternative A due to the habitat and plant protection measures that would be enacted under alternative C, adverse impacts from other actions would still exist. Therefore, the impacts of these other actions, added to the impacts of actions under alternative C, may affect / are likely to adversely affect seabeach amaranth on a regional basis.

Conclusion

ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative C. While surveying and management activities would reduce these impacts, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative C may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Under alternative D, surveying and management impacts would be the same as under alternative C and may affect / are likely to adversely affect seabeach amaranth.

The primary habitat of seabeach amaranth overlaps that of piping plover, American oystercatcher, and other protected bird species at the seashore. Similar to alternative A, the prior season's nesting habitat for piping plovers would be closed to public recreation beginning in April of each year. Active nesting areas for other protected species of birds would also be posted and protected in April, therefore, providing protection for seabeach amaranth seedlings that germinate within these areas during the time of bird nesting activities. In addition, some ramp-to-ramp closures may occur due to the presence of piping plover and American oystercatcher chicks, potentially helping to protect potential seabeach amaranth habitat. Under alternative D there would not be any bird closures during the non-breeding season, so these areas would not provide any additional year-round habitat protection for seabeach amaranth.

Similar to alternative A, there would be no management plan in place for the removal of webworms or beach vitex. Without management policies for webworms and beach vitex, these species, if found in the seashore, could have negative impacts on the seabeach amaranth population, therefore other management practices may affect / are likely to adversely affect seabeach amaranth.

Recreation Use. Under alternative D impacts would be the same as under alternative C. Recreation use under alternative D may affect / is likely to adversely affect seabeach amaranth.

Other Seashore Management. Informational brochures provided in the visitor center would include information about seabeach amaranth, and information about protected species and management related ORV and full-recreational closures would be provided at the ferry landings 7 days per week. This would inform people about the susceptibility of seabeach amaranth to impacts from recreation use and may help to reduce impacts. This may affect / is not likely to adversely affect seabeach amaranth.

Research efforts ongoing within the seashore would be the same as detailed under alternative A. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would affect / are not likely to adversely affect seabeach amaranth.

Cumulative Impacts

The overall cumulative impacts under alternative D would be similar to those described for alternative A. Although the impacts would be less than under alternative A due to the habitat and plant protection measures that would be enacted under alternative D, adverse impacts from other actions would still exist. Therefore, the impacts of these other actions, added to the impacts of actions under alternative D, may affect/are likely to adversely affect seabeach amaranth on a regional basis.

Conclusion

ORV and other recreational use would have both direct and indirect impacts on seabeach amaranth under alternative D. While surveying and management activities would reduce these impacts, though not as much as under alternatives B or C, there would still be a risk that plants would be crushed and seeds would be pulverized or buried. The actions taken under alternative D may affect / are likely to adversely affect seabeach amaranth. Past, current, and future activities both inside the seashore and within the plant's historic range, when combined with the impacts of recreation use, surveying, and management of the species expected under this alternative, would continue to result in impacts that may affect / are likely to adversely affect the seabeach amaranth. Impairment of seabeach amaranth would not occur under alternative D.

STATE-LISTED AND SPECIAL STATUS SPECIES

GUIDING POLICIES AND REGULATIONS

The NPS *Management Policies 2001* state that potential effects of agency actions would also be considered on state or locally listed species (NPS 2000a). The National Park Service is required to control access to important habitat for such species and to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend. In addition, one of the purposes of Cape Lookout National Seashore is to provide a refuge for wildlife at the seashore. Therefore, an analysis of the potential impacts on state-listed species and certain seashore sensitive species is included in this section.

GENERAL METHODOLOGY AND ASSUMPTIONS

The following information was used to assess impacts on state and special status species:

1. which species are found in areas likely to be affected by management actions described in the alternatives
2. habitat loss or alteration caused by the alternatives
3. displacement and disturbance potential of the actions and the species' potential to be affected by the activities

Specific methodologies that were implemented and assumptions that were made that pertained to the American oystercatcher, colonial waterbirds, Wilson's plover, and red knot are described under the relevant species impact analysis.

STUDY AREA

The study area for state and special status species is defined as the seashore for the analysis of the impacts of the alternatives and defined as the state of North Carolina for the analysis of cumulative impacts.

IMPACT THRESHOLDS

The assessment of impacts on wildlife species listed by the state of North Carolina (but not at the federal level under the Endangered Species Act) and special status species that the seashore has identified as needing special management consideration uses the same thresholds developed for the assessment of impacts on wildlife, rather than those for federally listed species.

<i>Negligible:</i>	There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
<i>Minor adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but would not be outside the natural range of variability. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors might occur. However, some impacts might occur during critical reproduction periods for a protected species, but would not result in injury or mortality. Sufficient habitat in the seashore would remain functional to maintain the viability of the species in the seashore.

<i>Minor beneficial:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but would not be outside the natural range of variability. Improvements to key characteristics of one habitat in the seashore would sustain or slightly improve existing population levels, population structure, or other factors and maintain the viability of the species.
<i>Moderate adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Frequent responses to disturbance by some individuals could be expected, with some negative impacts on feeding, reproduction, resting, or other factors affecting local population levels. Some impacts might occur during critical periods of reproduction or in key habitats in the seashore and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers or habitat in the seashore would remain functional to maintain the viability of the species in the seashore.
<i>Moderate beneficial:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Changes to key characteristics of habit in the seashore during critical periods of reproduction would minimize or prevent harassment or injury to one or more individuals and improve the viability of the species in the seashore.
<i>Major adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, would be expected to be outside the natural range of variability, and would be permanent. Frequent responses to disturbance by some individuals would be expected, with negative impacts on feeding, reproduction, or other factors resulting in a decrease in seashore population levels. Impacts would occur during critical periods of reproduction or in key habitats in the seashore and result in direct mortality or loss of habitat that might affect the viability of a sensitive species. Local population numbers, population structure, and other demographic factors might experience large declines.
<i>Major beneficial:</i>	Impacts on native species, their habitats in the seashore, or the natural processes sustaining them would be detectable, would be expected to be outside the natural range of variability, and would be permanent. Changes during critical periods of reproduction or in key habitats in the seashore would prevent mortality or loss of habitat and would result in notable increases in seashore population levels.
<i>Impairment:</i>	<p>The action would contribute substantially to the deterioration of state listed or special status species in the Cape Lookout National Seashore to the extent they would no longer function as a part of the natural system. In addition, some of these adverse major impacts on the seashore's resources and values would</p> <ul style="list-style-type: none"> • contribute to deterioration of state listed or special status wildlife resources and values to the extent that the purpose of the Cape Lookout National Seashore would not be fulfilled as established in its enabling legislation

- affect resources key to the natural or cultural integrity or opportunities for enjoyment in the Cape Lookout National Seashore
- affect the resource whose conservation is identified as a goal in the *General Management Plan* (NPS 2001b) or other planning documents for the Cape Lookout National Seashore.

Duration:

Short-term effects would be one to two breeding seasons for other protected species. Long-term effects would be anything beyond two breeding seasons. Under all alternatives, long-term effects may occur to any species well beyond the interim protected species management plan/EA, depending on the outcome of the long-term ORV management plan/EIS.

AMERICAN OYSTERCATCHER

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on oystercatcher populations and habitat were evaluated based on available data on the species' past and present occurrence at Cape Lookout National Seashore as well as the species' association with humans, pets, predators, and ORVs. Information on habitat and other existing data were acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to the American oystercatcher from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Under alternative A, American oystercatcher breeding areas on North Core Banks and South Core Banks would be surveyed across pre-nesting, nesting, and chick-rearing life stages. While surveying would result in the collection of beneficial data that would enable better species protection, surveying brings people into direct contact with oystercatchers and oystercatcher habitat and is a known risk factor (NPS 2006; McGowan 2004; Sabine 2005). Staff would use best professional judgment during surveying and attempt to minimize potential adverse impacts. However, surveying every two to three days may lead to frequent responses by some individual oystercatchers and has the potential to negatively impact feeding, reproduction, resting, or other factors during critical periods of reproduction or in key habitats, resulting in the chance for harassment, injury, or mortality to one or more individuals (NPS 2006; McGowan 2004; Sabine 2005). Surveying of non-breeding individuals does not occur under alternative A. Therefore, species surveying would likely have a long-term moderate adverse impact on American oystercatchers at Cape Lookout National Seashore on an annual basis during the pre-nesting and nesting season.

No management would be initiated under alternative A until an oystercatcher nest is located, at which time it is marked in an unobtrusive manner (e.g., a numbered wooden paint stirrer would be placed 30 feet east of the nest) and given an identification number. A 10 square-foot full recreational closure would then be established around the nest if it is located in an area subject to ORV or pedestrian traffic. When the chicks emerge and forage on the beach, a ramp-to-ramp ORV closure would be implemented if a backroad is available for ORV use; otherwise, ORV access would be allowed through the closure at reduced speeds. Both full recreational and ORV closures would provide protection to American oystercatchers during critical life stages. However, nests found in the dunes are not posted because of a concern that predators might learn to associate the posts with nests, resulting in increased predation. All

closures would be removed when the last chick has fledged or has been confirmed as lost, typically by August 15. Winter oystercatcher habitat is not posted under alternative A. Oystercatcher management activities would bring people and equipment into direct contact with oystercatchers and oystercatcher habitat and these activities, as with surveying, are known risk factors (NPS 2006; McGowan 2004; Sabine 2005). Therefore, impacts on American oystercatchers at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Predator exclosures would not be used for American oystercatchers under alternative A. Night driving would be allowed, and it is possible that at night ORVs could come in contact with foraging oystercatcher chicks and adults. The overall impact of other management (including all the impacts for the management of other species), at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Recreation Use. ORVs are prohibited year-round from Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. Pedestrians are not restricted from these ORV closures, but are prohibited from the 10 square-foot buffer (i.e., full recreational closure) that surrounds American oystercatcher nests outside the dunes. Likewise, pets are not allowed in any full recreational closure areas that immediately surround nests and outside these closures pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Kite flying, ball and Frisbee tossing, and night driving are not prohibited from oystercatcher nest sites during any part of the year, and all fireworks are prohibited in the seashore at all times. Thus, recreation use brings ORVs, pedestrians, and pets into direct contact with oystercatchers and oystercatcher habitat. These activities are known risk factors to oystercatchers (NPS 2006; McGowan 2004; Sabine 2005).

As noted above, alternative A also provides for ramp-to-ramp ORV closures if oystercatcher chicks are present on the beach. In these cases, ORVs are routed to a backroad via designated ramps. If no backroad is present, then ORVs would be allowed at 15 mph and signs would be posted warning operators of flightless chicks in the area. These ramp-to-ramp closures are reopened to ORV after the last chick has fledged or is lost.

While ramp-to-ramp closures provide protection from ORVs driven by the public, oystercatcher chicks in areas without a backroad would not receive sufficient protection from either the 15 mph speed limits or from warning signs. This is primarily because chicks are known to seek safety from approaching vehicles by crouching in tire track depressions where they would be at risk of being run over by ORVs.

Similarly, the protection intended by full recreational closures around nests only occurs to a distance of 10 square feet. Because protection does not occur until actual nesting, this is not early enough in the American oystercatcher breeding cycle nor is the nest buffer large enough to provide minimal protection.

As described above, these recreation activities would likely cause direct, adverse impacts on many oystercatchers, including the loss of young or eggs due to recreation use and flushing from the nest that would be detectable and expected to be outside the natural range of variability. These adverse impacts could lead to permanent abandonment of otherwise suitable oystercatcher nesting sites. Furthermore, the recreating public's compliance with full recreational closures around nests and ORV closures associated with foraging chicks is not 100% and therefore invariably brings people, ORVs, pets, and other recreational equipment into direct contact with oystercatchers and their nesting habitat. This is a major concern because oystercatchers need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat (NPS 2006). In addition to this loss of habitat from human disturbance, there are documented cases of ORVs running over oystercatcher chicks (Simon et al. 2004; NPS 2006). Under alternative A, frequent disturbance to oystercatchers would be expected to result in adverse impacts on their reproduction and feeding. Some of these impacts would occur during the most critical periods of reproduction and within key oystercatcher habitat and result in direct mortality or loss of habitat. This has and would continue to

lead to population declines and habitat loss, resulting in a long-term, major adverse impacts from recreation use.

Other Seashore Management. Outreach efforts would continue to include the distribution of informational brochures about the seashore's endangered species at the visitor center and providing the visiting public with educational materials through posted signs, site bulletins, interpretive programs, press releases notifying public of non-routine closures that affect ORV driving, and the Cape Lookout National Seashore website. No entrance station/education outreach would be performed under alternative A. Impacts related to outreach would be long-term, minor to moderate beneficial on oystercatchers.

Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A includes one supervisor, one field ranger, and two 6-month seasonal rangers, which together provide compliance monitoring for up to 2 to 3 days per week at North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Species protection is performed concurrently with other duties in the field. Actual coverage is likely to be substantially lower than 2 to 3 days per week, per area, since law enforcement staff is subject to time consuming enforcement actions, local emergency responses, and mandatory long-term participation in national emergencies (e.g., hurricanes, homeland security, fire, etc.). Because night enforcement is staff intensive and would heavily impact time available for day enforcement, no regularly scheduled night enforcement would occur under alternative A. Compliance would be minor to moderate beneficial to the American oystercatcher because staff would be available and present to enforce compliance with closures at least part time.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on the American oystercatcher. Overall, the predator removal study could have beneficial impacts because predators play such a substantial and harmful role in the breeding performance of this species at Cape Lookout National Seashore. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers.

Cumulative Impacts

The past, current, and future actions discussed under the cumulative impact scenario could be expected to have a range of impacts on locally sensitive bird species. The dredging activity in Beaufort Inlet could have short-term moderate adverse impacts on any American oystercatchers that are holding territories and/or attempting to nest in that area, and maintenance dredging could result in long-term habitat building that could be minor beneficial to nesting. Impacts would depend on the timing and duration of the maintenance dredging of Beaufort Inlet as well as the type and placement of the dredge spoils.

Stabilization of historic structures could have short-term impacts, especially if it takes place during breeding and if it encroaches on any buffers around nests within full recreational or ORV closures for the American oystercatcher. If this were the case, direct, short-term impacts could result that would have minor to moderate adverse impact on nesting success. Conversely, stabilization of historic structures is unlikely to result in either stabilizing or creating new bird nesting habitat. The degree to which this activity is beneficial or adverse is a function of the extent, timing, and location of the activity itself relative to bird nesting and to the degree to which the activity results in the creation or maintenance of high-quality American oystercatcher habitat.

Storms and other weather events during the breeding season (March–August) of locally sensitive bird species can result (depending upon storm intensity), in disturbance of nesting birds or even in the washing away of nests or eggs. These impacts would be direct, short-term and moderate adverse for the nesting birds impacted. In addition to the timing of summer storms, storm severity is also an important variable.

Powerful storms can surge high up and overwash large areas of breeding habitat, including up to the toe of the dune and beyond, and result in loss of scrapes, nests, eggs, chicks, and even breeding adults. Conversely, winter, late-fall, and early-spring storms are capable of being both long-term minor to moderate beneficial to birds by depositing new materials and creating overwash areas and hence new nesting habitat for birds or having long-term minor to moderate adverse impacts by eroding and removing otherwise suitable habitat. Hence, the impact scenario of storms and nesting birds depends on the timing and severity of storm events and whether the events result in net habitat creation or destruction.

Hurricane recovery that pulls staff from resource management (and presumably surveying) activities during the breeding season for American oystercatchers would have the short-term impact of denying whatever benefit that may have been derived from the management but simultaneously protect them from the disturbance that invariably comes along with surveying (in particular) and management. Conversely, hurricane recovery that takes place outside of the breeding season would have no effect on locally sensitive bird species. However, because the hurricane season overlaps essentially the entire breeding season, any loss of staff services would be minor adverse to Cape Lookout National Seashore.

The horse management plan, concessionaires and ferry operations, and the comprehensive interpretation plan would all have negligible impacts on American oystercatcher. However, the proposed state listing of the American oystercatcher could have long-term, moderate to major beneficial effect on these species if the listing results in substantial and appropriate population management.

Several of the local and NPS past, current, and future planning efforts could also affect locally sensitive bird species. The outcome of the current action to develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA would have direct, short-term impacts on locally sensitive bird species which can move back and forth during nesting, migration, and overwintering. However, whether the impact of the strategy/EA would be beneficial or adverse to these species would depend upon the management decisions that are made and ultimately implemented.

Other future planning efforts include the development of long-term ORV management plan/EISs for both Cape Lookout National Seashore and Cape Hatteras National Seashore, which would have direct, long-term impacts on locally sensitive bird species which nest, migrate, and overwinter in Cape Lookout National Seashore. However, whether the impact of these two ORV plans would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented. The outcome of the Cape Lookout National Seashore long-term ORV management plan/EIS would have direct, long-term impacts on locally sensitive bird species which can move back and forth during nesting, migration and overwintering. However, whether the impact of the long-term ORV management plan/EIS would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented.

Finally, the Cape Lookout National Seashore predator study could be important because predators play such a substantial and deleterious role in the breeding performance of locally sensitive bird species at Cape Lookout National Seashore. However, whether the impact of the predator study would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are implemented.

The overall cumulative impact of these past, current, and future actions would have long-term minor adverse impacts on locally sensitive bird species at Cape Lookout National Seashore.

The long-term, minor, adverse impacts from these past, present, and potential future actions, when combined with the major adverse impacts on American oystercatchers from recreational use at the seashore under alternative A, would result in long-term, moderate to major, adverse cumulative impacts.

Conclusion

Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use under alternative A would likely to lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. The same surveying activities would occur as described under alternative A, with additional surveys conducted for American oystercatcher activity not less than 2 days per week beginning in late-March. Surveys of nesting habitat on North Core Banks and South Core Banks would be conducted several times per week from early-April to mid-July and surveys of Shackleford Banks would be conducted 2 days per week. GPS data would be recorded for oystercatchers exhibiting courtship and territorial behaviors and broods would be surveyed at least 7 days per week. During surveying, any signs of potential predators or threats (e.g., deep vehicle tracks, which prevent chicks from accessing the beach) would be collected and recorded under alternative B. Surveying would end when all chicks have fledged or have been confirmed to be lost.

As in alternative A, surveying would result in the collection of beneficial data that would enable better species protection. However, surveying activities also brings people into direct contact with oystercatchers and oystercatcher habitat and this is a known risk factor (NPS 2006; McGowan 2004; Sabine 2005). Staff would use best professional judgment during surveying to minimize adverse impacts. However, surveying may lead to frequent responses by some individual oystercatchers and has the potential to negatively impact feeding, reproduction, resting, or other factors during critical periods of reproduction or in key habitats, resulting in the chance for harassment, injury, or mortality to one or more individuals (NPS 2006; McGowan 2004; Sabine 2005). Survey of non-breeding individuals does not occur. Therefore, species surveying would likely have a long-term moderate adverse impact on American oystercatchers at Cape Lookout National Seashore on an annual basis during the pre-nesting and nesting season.

As under Alternative A, ORV closures would be maintained year-round at Portsmouth Flats, the interior of Cape Lookout Point, between mile markers 41A and 41B, and Power Squadron Spit. Additionally, seasonal restrictions would include a full recreational closure that would prohibit ORVs and pedestrians from the 2 miles along the north end of South Core Banks and an ORV closure that would prohibit only ORVs from Middle Core Banks and “Ophelia Banks.” When an oystercatcher nest is located, a 10 square-foot full recreational closure would be established around the nest if it is located in an area subject to ORV or pedestrian traffic. Ramp-to-ramp closures would also be implemented if chicks are found foraging on the beach and a backroad is available for ORVs, except that ORV closures would adjust and move with chicks and provide a minimum 300-foot buffer around broods. If no backroad is available, ORVs would be allowed at reduced speeds through the beach area, but signs would warn of chick presence. Also, no camping would be allowed between ramps where a high nest concentration (3 or more nests between 2 ramps) occurs.

The closures would afford some protection for the American oystercatcher; however, as described in alternative A, when no backroad is available for ORVs, oystercatcher chicks on the beach would not receive sufficient protection from either the 15 mph speed limits or from warning signs. Additionally, outside these full recreational and ORV closure areas, people and equipment would continue to come into direct contact with oystercatchers and oystercatcher habitat and these activities, as with surveying, are

known risk factors (NPS 2006; McGowan 2004; Sabine 2005). Therefore, impacts on American oystercatchers at Cape Lookout National Seashore would be long-term, minor, and adverse.

Predator exclosures are not used for American oystercatchers under alternative B. Night driving would be allowed, and it is possible that at night ORVs may come in contact with foraging oystercatcher chicks and adults. The overall impact of other management at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Recreation Use. Pedestrians and pets would be allowed within the seasonal and year-round ORV closures listed above, but would be prohibited within the full recreational closures around nests and along the northern end of South Core Banks; pets would be prohibited in the seashore from April 15 to August 31. During the remainder of the year, pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore. Other recreation opportunities such as kite flying, and ball and Frisbee tossing would be allowed outside of full recreational closures. Night driving would not be prohibited except from Ramp 41B to Ramp 44 from May 1 to the last turtle hatch, and all fireworks are prohibited in the seashore at all times.

Recreation use brings ORVs, pedestrians, and pets into direct contact with oystercatchers and oystercatcher habitat and these activities are all known risk factors to the oystercatcher (NPS 2006; McGowan 2004; Sabine 2005). Full recreational closures to a distance of 10 square feet around oystercatcher nests is not early enough or large enough to provide minimal protection. Ramp-to-ramp closures to protect chicks are not guaranteed unless alternate ORV access is available via a backroad. Therefore, recreation activity would likely cause direct, adverse impacts, such as the loss of young or eggs due to recreation use and flushing from the nest that would be detectable and would be expected to be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable oystercatcher nesting sites. This is a major concern because oystercatchers need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat (NPS 2006). In addition to this loss of habitat from human disturbance, there are documented cases of ORVs running over oystercatcher chicks (Simon et al. 2004; NPS 2006). Under alternative B, frequent disturbance to oystercatchers would be expected to result in negative impacts on their reproduction and feeding. Some of these impacts would occur during the most critical periods of reproduction and within key oystercatcher habitat, resulting in direct mortality or loss of habitat. This has led and would continue to lead to population declines and habitat loss at Cape Lookout National Seashore, resulting in a long-term, major adverse impact from recreation use.

Other Seashore Management. Under alternative B, outreach efforts would include all of the elements of alternative A with the addition of two law enforcement rangers to be stationed at Long Point and Great Island ferry landings. The rangers would be responsible for contacting all ORV users entering the seashore 4 days out of 7 per week, 10 hours per day, to relay information about species, closures, and pet leash regulations. Use of law enforcement staff in this role would assist with compliance. Outreach efforts would result in long-term, minor to moderate beneficial impacts on American oystercatchers.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, requiring one supervisor, one field ranger and two 6-month seasonal rangers, who, together, would monitor compliance up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island (see alternative A). Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would result in long-term, minor to moderate beneficial impacts on American oystercatchers.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of

these research activities, there may or may not be an effect on American oystercatchers as discussed in alternative A.

Cumulative Impacts

Impacts from past, present, and other future actions would be the same as those described under alternative A and would result in long-term, minor, adverse impacts. These impacts in combination with the major adverse impacts from recreational use at the seashore under alternative B would result in long-term, moderate to major, adverse cumulative impacts on American oystercatchers.

Conclusion

Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative B would likely lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Surveying activities under alternative C would be the same as under alternative B except that broods surveyed would be surveyed at least 3 to 5 days per week. Law enforcement presence would also be increased for additional closures and resource protection. As with alternatives A and B, surveying would end when all chicks have fledged or have been confirmed to be lost. Surveying would result in the collection of data that would enable better species protection, but would also bring people into direct contact with oystercatchers and oystercatcher habitat (NPS 2006; McGowan 2004; Sabine 2005). Staff would use best professional judgment during surveying to minimize adverse impacts. However, surveying could lead to frequent responses by some individual oystercatchers and has the potential to negatively impact feeding, reproduction, resting, or other factors during critical periods of reproduction or in key habitats, resulting in a chance of harassment, injury, or mortality to one or more individuals (NPS 2006; McGowan 2004; Sabine 2005). Survey of non-breeding individuals would not occur. Species surveying would likely have a long-term moderate adverse impact on American oystercatcher at Cape Lookout National Seashore on an annual basis during the pre-nesting and nesting season.

Species management would be the same as under alternative B, except that ramp-to-ramp ORV closures could occur earlier in the breeding process. Under alternative C, any area between two ramps with three or more oystercatcher pairs displaying courtship/mating behavior would be closed to ORVs and traffic would be rerouted to the backroad, if available. If there is no available backroad, ORV traffic would be allowed through the closure area at 15 mph with signs warning drivers of flightless chicks in the area. Under limited circumstances, vehicle escorts could also be provided. ORV closures would be adjusted based on chick movement to ensure a minimum 300-foot buffer.

Although American oystercatchers would be afforded some protection during breeding activities, in ORV closure areas where no backroad is available, oystercatcher chicks would not receive sufficient protection from either the 15 mph speed limits or from warning signs. In areas outside full recreational closures, oystercatcher management would continue to bring people and equipment into direct contact with oystercatchers and oystercatcher habitat and these activities, as with surveying, are known risk factors (NPS 2006; McGowan 2004; Sabine 2005). Therefore, impacts on American oystercatchers at Cape Lookout National Seashore would be long-term, minor, and adverse.

Predator exclosures are not used for American oystercatchers under alternative C. Night driving would be allowed, and it is possible that ORVs may come in contact at night with foraging oystercatcher chicks and adults. The overall impact of other management at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Recreation Use. As in alternative A, ORVs would be prohibited year-round from Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. ORVs would also be prohibited seasonally from the northern end of South Core Banks and from Middle Core Banks and “Ophelia Banks.” Pedestrians and pets on leash would be allowed within these ORV closure areas. Kite flying, ball and Frisbee tossing, and night driving are not prohibited from oystercatcher nest sites during any part of the year, and all fireworks are prohibited in the seashore at all times. Camping would not be allowed between any ramps that support three or more oystercatcher nests. Recreation use brings ORVs, pedestrians, and pets into direct contact with oystercatchers and oystercatcher habitat. These activities are all known risk factors (NPS 2006; McGowan 2004; Sabine 2005).

Protection only occurs for some oystercatcher nests in high-density (3 or more nests) areas and around nests to a distance of 10 square feet. This is not early enough or large enough to provide sufficient protection. Therefore, recreation activity would likely cause direct, adverse impacts, such as the loss of young or eggs due to recreation use and flushing from the nest that would be detectable and expected to be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable oystercatcher nesting sites. This is a major concern because oystercatchers need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat (NPS 2006). In addition to this loss of habitat from human disturbance, there are documented cases of ORVs running over oystercatcher chicks (Simon et al. 2004; NPS 2006). Under alternative C, frequent responses to disturbance to oystercatchers would be expected to result in adverse impacts on their reproduction and feeding. Some of these impacts would occur during the most critical periods of reproduction and within key oystercatcher habitat, and would result in direct mortality or loss of habitat. This has and would continue to lead to population declines and habitat loss at Cape Lookout National Seashore, resulting in a long-term, moderate adverse impact from recreation use.

Other Seashore Management. Under alternative C, outreach efforts would include all the elements of alternatives A and B but with the addition of 4 seasonal law enforcement rangers to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day, to relay information about species and closures. Use of law enforcement personnel in this role would assist with compliance. New and larger closure signs would be designed for birds and seabeach amaranth, and daily morning vehicle closure information would be posted to a map at the ferry landings and to the seashore website. These outreach efforts would result in long-term, minor to moderate beneficial impacts on American oystercatchers.

Established ORV and full recreational closures would be enforced during daytime hours up to 3 to 5 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island with the addition of 3 enforcement rangers. Nighttime enforcement would be the same as alternative B, occurring up to 4 nights per month throughout the seashore. This level of staffing would help mitigate impacts of emergency operations and mandatory commitments to national emergency responses. Outreach staff at ferry landings and camps would also improve compliance, since visitors would know that enforcement staff are present on North Core Banks and South Core Banks. This presence and enforcement of compliance would result in long-term, minor to moderate beneficial effects on American oystercatchers.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use

study to measure the impact of ORVs on beach birds. Impacts on American oystercatchers would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Impacts from past, present, and other future actions would be the same as those described under alternative A and would result in long-term, minor, adverse impacts. These impacts in combination with the major adverse impacts from recreational use at the seashore under alternative C would result in long-term, moderate to major, adverse cumulative impacts on American oystercatchers.

Conclusion

Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on American oystercatchers. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying. Species surveying activities under alternative D would be the same as outlined under alternative A except that nests and chicks would be surveyed every 2 days. As with other alternatives, surveying would result in the collection of data that would enable better species protection, but would also bring people into direct contact with oystercatchers and oystercatcher habitat (NPS 2006; McGowan 2004; Sabine 2005). Staff would use best professional judgment during surveying and attempt to minimize adverse impacts. Surveying may lead to frequent responses by some individual oystercatchers and has the potential to negatively impact feeding, reproduction, resting or other factors during critical periods of reproduction or in key habitats, resulting in the chance for harassment, injury, or mortality to one or more individuals (NPS 2006; McGowan 2004; Sabine 2005). Survey of non-breeding individuals would not occur under alternative D. Because surveying would be less intensive under alternative D than any other alternative, species surveying would likely have a long-term minor adverse impact on American oystercatchers at Cape Lookout National Seashore.

Species management would be the same as alternative B. As in other alternatives, if chicks are present on the beach, ramp-to-ramp vehicle closures would occur and, if possible, ORV traffic would be rerouted to the backroad via designated ramps. In areas without a backroad system, ORV traffic would be allowed at 15 mph, with signs warning operators of flightless chicks in the area. Areas would be reopened to ORVs after chicks have fledged or have been confirmed to be lost. Despite some protection measures, these management activities would bring people and equipment into direct contact with oystercatchers and oystercatcher habitat outside of closure areas or when backroads are not available, and these activities, as with surveying, are known risk factors (NPS 2006; McGowan 2004; Sabine 2005). Therefore, impacts on American oystercatchers at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Similar to other alternatives, predator exclosures would not be used for American oystercatchers under alternative D. Night driving would be allowed, and it is possible that at night ORVs may come in contact with foraging oystercatcher chicks and adults. The overall impact of other management (including all the impacts for the management of other species), at Cape Lookout National Seashore would be long-term, moderate, and adverse.

Recreation Use. As in alternative A, ORVs would be prohibited year-round from Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. ORVs would also be prohibited seasonally from the northern end of South Core Banks and from Middle

Core and “Ophelia Banks.” Pedestrians and pets on leash would be allowed within these all of these ORV closure areas. As such, the risk factor from recreation use would be present (NPS 2006; McGowan 2004; Sabine 2005). Full recreational closures would occur to some oystercatcher nests, but only to a distance of 10 square feet. This is not early enough or large enough to provide minimal protection. Therefore, recreation activity would likely cause direct, adverse impacts on many oystercatchers and could include the loss of young or eggs due to recreation use and flushing from the nest that would be detectable and expected to be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable oystercatcher nesting sites. In addition to loss of habitat from human disturbance, there are documented cases of ORVs running over oystercatcher chicks (Simon et al. 2004; NPS 2006). Under alternative D, frequent disturbance to oystercatchers would be expected to result in adverse impacts on their reproduction and feeding. Some of these impacts would occur during the most critical periods of reproduction and within key oystercatcher habitat and result in direct mortality or loss of habitat. This has and would continue to lead to population declines and habitat loss at the seashore, resulting in a long-term, major adverse effect from recreation use.

Other Seashore Management. Under alternative D, outreach efforts would include all of the elements of alternative A with the addition of 4 interpretation staff to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day, to relay educational information about species and closures. Outreach efforts would result in long-term, minor to moderate beneficial effects on American oystercatchers.

Compliance with the established ORV and full recreational closures would be enforced as detailed under alternative A, with compliance monitoring occurring up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Night monitoring would not occur. Enforcement of compliance would have long-term, minor to moderate beneficial impacts on American oystercatchers.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Impacts on American oystercatchers would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Impacts from past, present, and other future actions would be the same as those described under alternative A and would result in long-term, minor, adverse impacts. These impacts in combination with the major adverse impacts from recreational use at the seashore under alternative D would result in long-term, moderate to major, adverse cumulative impacts on American oystercatchers.

Conclusion

Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on the American oystercatcher. Because protection measures for nesting oystercatchers and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely to lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to American oystercatchers at Cape Lookout National Seashore would not occur under alternative D.

COLONIAL WATERBIRDS

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on colonial waterbird populations and habitat were evaluated based on available data on the species’ past and present occurrence at Cape Lookout National Seashore as well as the species’ association with humans, pets, predators, and ORVs. Information on habitat and other existing data were

acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to colonial waterbirds from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Alternative A defines a range of surveying actions across pre-nesting, nesting, migration, and overwintering life stages, but does not include observation of reproductive performance / nesting success of colonial waterbirds. Hence, these data are not available to measure the success or impact of management and other actions defined under alternative A. Also, migrant and wintering colonial waterbirds and their habitats are not surveyed at Cape Lookout National Seashore.

Pre-nesting, courtship, nesting, and brood surveys of active nesting areas for colonial waterbirds would take place during piping plover surveys at least once every 3 days. Surveying of potential new habitat and historical nesting areas would occur if time permits. No non-breeding surveys would occur because colonial waterbirds are not typically found at Cape Lookout National Seashore outside of the breeding season. Surveying would end when all colonial waterbird chicks have fledged or have been confirmed to be lost. Although surveying would provide beneficial data that would be used to better protect the species, surveying would bring people and equipment into direct contact with colonial waterbirds and their habitat and is a known risk factor. Because colonial waterbirds are all ground-nesters, they are highly vulnerable to direct human activities such as ORVs, pedestrians, photographers, and wildlife managers/scientists (Buckley and Buckley 1976; Erwin 1980, 2005). In particular, modest disturbances early in the spring when colonial waterbirds are first arriving and prospecting for breeding sites can be highly disruptive (Buckley and Buckley 1976). If surveying distance is too close (for example, less than 600 feet) (Rogers and Smith 1995; Erwin 1989, 2005), it could lead to frequent flushing responses, and potentially negatively impact feeding, reproduction, resting, or other factors. Therefore, under alternative A, surveying would likely have long-term, moderate adverse impacts on an annual basis during the pre-nesting and nesting season.

Using symbolic fencing, full recreational closures would be established on April 15 in areas where colonial waterbirds are nesting or nested in the previous breeding season. ORV closures would be implemented around April 15 in historical nesting areas used by any terns and skimmers, including Cape Point and Morgan Island (Morgan Island would be posted on April 1). Full recreational closures would be established 150 feet from the outside nests and expanded as necessary when nests or nest scrapes are found in new areas. When a nest hatches, the Cape Lookout Point beach area would be closed to vehicle access when chicks are present on the beach. Other beach areas would also be closed to ORVs and traffic re-routed if chicks are in danger of being run over. Pedestrians and pets would continue to have access within these ORV closure areas. Species management activities would bring people and equipment into direct contact with colonial waterbirds and their habitat and these activities, as with surveying, are known risk factors (Buckley and Buckley 1976; Erwin 1980, 2005). Although full recreational closures around nests and ORV closures to protect chicks would provide a deterrent to the entry of people, pets, and ORVs into their habitats, alternative A would likely have long-term, minor to moderate adverse impacts on colonial waterbirds.

Predator exclosures and predator trapping would not be implemented for colonial waterbirds. Because predators are potentially key to the success of colonial waterbirds and other ground nesting birds, the lack of a clear predator management plan means that colonial waterbirds at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects on colonial waterbirds.

Recreation Use. ORVs would be prohibited from Portsmouth Flats, the interior of Cape Lookout Point, beach between mile markers 41A and 41B, and Power Squadron Spit year-round. Pedestrians and pets would have continued access within these permanent ORV closures, but would be prohibited from the full recreational closures that immediately surround colonial waterbird nests (within 150 feet of the nest). Outside these full recreational closures, pets must be crated, caged, restrained on a leash, or otherwise physically confined at all times in all areas of the seashore.

Recreation use would bring ORVs, pedestrians, and pets into direct contact with colonial waterbirds and their habitat, and these activities are all known risk factors (Buckley and Buckley 1976; Erwin 1980, 2005). Lack of consistency in applying closure protection to colonial waterbirds from recreation activities would result in negative impacts (such as direct damage to nests, eggs, or chicks, or flushing from the nest) that would be detectable, might be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable nesting sites. Furthermore, the recreating public's compliance with closures is not 100% and invariably brings people, ORVs, pets, and other recreational equipment into direct contact with colonial waterbirds and colonial waterbird nesting habitat. Incidents of visitors encroaching on posted colonial waterbird closures at the seashore have been documented (NPS 2006). Impacts from recreation use are a concern because colonial waterbirds need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat (NPS 2006).

Under alternative A, frequent disturbance from recreation use could be expected, resulting in adverse impacts on colonial waterbird reproduction and chick-feeding. Some of these impacts would occur during critical periods of reproduction and within key colonial waterbird habitats and are known to result in direct mortality, abandonment of nest sites, or loss of habitat. However, because reproductive success is not surveyed for colonial waterbirds, it is not known to what extent recreation use may or may not lead to annual or seasonal population declines at Cape Lookout National Seashore. Overall, the impact of recreation use under alternative A would be long-term, moderate to major and adverse.

Other Seashore Management. Outreach efforts would continue to include the distribution of informational brochures on the seashore's endangered species at the visitor center and providing the visiting public with educational materials through posted signs, site bulletins, interpretive programs, press releases notifying public of non-routine closures that affect ORV driving, and the Cape Lookout National Seashore website. No entrance station/education outreach would be performed under alternative A. Outreach efforts would have no long-term effect or would be minor to moderate beneficial to colonial waterbirds.

Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A includes one supervisor, one field ranger, and two 6-month seasonal rangers, which together provide compliance monitoring for up to 2 to 3 days per week at North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Species protection is performed concurrently with other duties in the field. Actual coverage is likely to be substantially lower than 2 to 3 days per week, per area, since law enforcement staff are subject to time consuming enforcement actions, local emergency responses, and mandatory long-term participation in national emergencies (e.g., hurricanes, homeland security, fire, etc.). Because night enforcement is staff intensive and would heavily impact time available for day enforcement, no regularly scheduled nighttime activities would occur under alternative A. Compliance efforts would result in long-term, minor to moderate beneficial effects on colonial waterbirds.

Research activities under alternative A include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending upon the intensity, location, and timing, these research activities may or may not have an effect on colonial waterbirds nesting. The predator removal study could have beneficial effects on colonial waterbirds, if implemented, because predators affect breeding performance of this species. The

visitor use study could benefit colonial waterbirds once more detailed information on visitor use patterns is available to resource managers.

Cumulative Impacts

The past, present, and future actions discussed under the cumulative impact scenario could be expected to have a range of impacts on colonial waterbirds. The dredging activity in Beaufort Inlet could have short-term moderate adverse impacts on colonial waterbirds that are holding territories and/or attempting to nest in that area, and maintenance dredging could result in long-term habitat building that could be minor beneficial to nesting. Impacts would depend on the timing and duration of the maintenance dredging of the Beaufort Inlet Channel as well as upon the type and placement of the dredge spoils.

Stabilization of historic structures could have short-term impacts, especially if it takes place during the breeding season and if it encroaches on any nest buffers that occur within recreation closures. If this were the case, it could result in direct, short-term impacts that could have minor to moderate adverse impacts on nesting success. Conversely, stabilization of historic structures is unlikely to result in either stabilizing or creating new bird nesting habitat. The degree to which this activity is beneficial or adverse is a function of the extent, timing, and location of the activity itself relative to bird nesting and to the degree to which the activity results in the creation or maintenance of high-quality colonial waterbird habitat.

Storms and other weather events during the breeding season (March–August) of locally sensitive bird species can result (depending upon storm intensity) in disturbance of nesting birds or even in the washing away of nests or eggs. These impacts would be direct, short-term and moderate adverse for the nesting birds impacted. In addition to the timing of summer storms, storm severity is also an important variable. Powerful storms can surge high up and overwash large areas of breeding habitat including up to the toe of the dune and beyond, and could result in loss of scrapes, nests, eggs, chicks, and even breeding adults. Conversely, winter, late-fall, and early-spring storms are capable of being both long-term minor to moderate beneficial to birds by depositing new materials and creating overwash areas and hence new nesting habitat for birds or having long-term minor to moderate adverse impacts by eroding and removing otherwise suitable habitat. Hence, the impact scenario of storms and nesting birds depends on the timing and severity of storm events and whether they result in net habitat creation or destruction.

Hurricanes can also affect colonial waterbirds because of their impact on staff resources. Recovery that pulls staff from resource management (and presumably surveying) activities during colonial waterbird breeding season would have a short-term adverse effect. However, because the hurricane season overlaps essentially the entire breeding season, any loss of staff services would be minor adverse.

The horse management plan, concessionaires and ferry operations, and the comprehensive interpretation plan would all have negligible impact on colonial waterbirds.

Several of the local and NPS past, current, and future planning efforts can also affect locally sensitive bird species. The outcome of the current action to develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA would have direct, short-term impacts on locally sensitive bird species which can move back and forth during nesting, migration and overwintering. However, whether the impact of the interim strategy/EA would be beneficial or adverse to these species would depend upon the management decisions that are made and ultimately implemented.

Other future planning efforts include the development of long-term ORV management plan/EISs for both Cape Lookout National Seashore and Cape Hatteras National Seashore, which would have direct, long-term impact on locally sensitive bird species which nest, migrate, and overwinter in Cape Lookout National Seashore. However, whether the impact of these two ORV plans would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented. The outcome of the Cape Lookout National Seashore long-term ORV management plan/EIS would have direct, long-term impacts on locally sensitive bird species which can move back and forth during nesting, migration and overwintering. However, whether the impact of the

long-term ORV management plan would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented.

Finally, the Cape Lookout National Seashore Predator Study could be significant because predators play such a substantial and deleterious role in the breeding performance of locally sensitive bird species at Cape Lookout National Seashore. However, whether the impact of the predator study would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are implemented.

The long-term, minor, adverse impacts of these past, current and future actions when combined with the moderate, adverse impacts under alternative A would result in long-term, minor to moderate, adverse cumulative impacts on colonial waterbirds from recreational use at the seashore.

Conclusion

Under alternative A, surveying and recreational use would have long-term moderate adverse impacts on colonial waterbirds. Species management and other management would have long-term, minor impacts. Cumulative impacts would be long-term, minor to moderate, and adverse. Impairment to colonial waterbirds would not be expected to occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Alternative B would include more intensive surveying of colonial waterbirds during the nesting phase including the surveying of reproductive performance. Surveying colonial waterbirds for reproductive performance would have a moderate adverse impact on nesting performance annually, due to the nature of the surveying regime described under alternative B. This is primarily because alternative B requires the surveying of reproductive success or annual fecundity, which would bring surveying staff into direct contact with nesting colonial waterbirds during very sensitive life history stages.

Species management of colonial waterbirds under alternative B would expand full recreational closures around nests to 300 feet. Other components of species management would be the same as under alternative A and would bring people and equipment into direct contact with colonial waterbirds and their habitat. These management activities are known risk factors (Buckley and Buckley 1976; Erwin 1980, 2005). Conversely, posting larger full recreational closures around colonial waterbirds nests with symbolic fencing would provide a deterrent to the entry of people and ORVs into their habitats. Pets would also be prohibited from the seashore from April 15 to August 31. Disturbance from recreation could lead to abandonment (Rogers and Smith 1995; Erwin 1989, 2005) of colonial waterbirds, especially early in the season before the larger closures are implemented and in new or established nesting habitat. Overall management under alternative B would result in long-term, minor adverse effects on colonial waterbirds.

Colonial waterbird management does not include any plan for controlling predators in colonial waterbird habitat. Night driving/recreation would be prohibited under alternative B from Ramp 41B to Ramp 44 from 8:00 PM to 6:00 AM beginning May 1 until the last turtle nest hatches. Use of the backroad for night driving would be encouraged elsewhere. Because colonial waterbirds can be very active at night, night driving restrictions would afford more protection than under alternative A. Other management under alternative B would provide more protection to colonial waterbirds than under alternative A, but would continue to expose birds to predators. Overall there would be long-term, minor to moderate adverse impacts on colonial waterbirds.

Recreation Use. As in alternative A, ORV closures would be maintained year-round at Portsmouth Flats, the interior of Cape Lookout Point, between mile markers 41A and 41B, and Power Squadron Spit. Seasonal restrictions would include a full recreational closure that would prohibit ORVs and pedestrians

from the 2 miles along the north end of South Core Banks and an ORV closure that would prohibit only ORVs from Middle Core Banks and “Ophelia Banks.” Historically used tern and skimmer nesting areas would be closed to ORVs and expand as necessary when nests or nest scrapes are found. ORV traffic would be allowed in a corridor along the shoreline, as long as at least a 150-foot buffer is maintained around active nests. Once chicks are mobile, these buffers would increase to 600 feet for ORVs. Vehicles would still be able to drive or park within the ORV corridor as long as the buffer is maintained. Pedestrians would have continued access within ORV closures, but would be prohibited from the full recreational closures that immediately surround colonial waterbird nests. Pets would be seasonally prohibited from the seashore.

Impacts from recreation use could be major because colonial waterbirds need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat and especially during pre-nesting, territory establishment, courtship and nesting phases (Erwin 2005). Under alternative B, frequent disturbance would result primarily from pedestrian use. However, because terns and/or skimmers are found in most colonies, the full recreational closures and seasonal pet prohibition within the seashore would protect most colonial waterbird colonies from pedestrian and pet disturbance. Because alternative B provides heightened protection of colonial waterbirds from recreation at the seashore, the overall impact of recreation use would be long-term, minor and adverse.

Other Seashore Management. Under alternative B, outreach efforts would include all the elements of alternative A with the addition of 2 law enforcement rangers to be stationed at Long Point and Great Island ferry landings. The rangers would be responsible for contacting all ORV users entering the seashore 4 days out of 7 per week, 10 hours per day, to relay information about species, closures, and pet leash regulations. Use of law enforcement staff in this role would assist with compliance. These outreach efforts would result in long-term, minor to moderate beneficial effects on colonial waterbirds because visitors would be provided needed education on species protection.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, requiring one supervisor, one field ranger and two 6-month seasonal rangers, who, together, would monitor compliance up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island (see alternative A). Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have long-term, minor to moderate beneficial impacts on colonial waterbirds because rangers would be present on the beaches to help regulate visitor use.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Impacts on colonial waterbirds would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Impacts related to past, current, and future actions at Cape Lookout National Seashore that could affect colonial waterbirds would be the same as outlined in alternative A. Overall, impacts from these actions would be long-term, minor and adverse. These impacts, when combined with the major adverse impacts from recreational use at the seashore under alternative B, would result in long-term, moderate to major adverse cumulative impacts on colonial waterbirds.

Conclusion

Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds entail some risks and do not apply equally to all birds, recreational use under alternative B would likely

lead to long-term minor to moderate adverse impacts. Cumulative impacts would be long-term, moderate to major adverse. Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Impacts related to surveying activities would be the same as under alternative A. Although surveying would provide beneficial data for management of colonial waterbirds, surveying would bring people and equipment into direct contact with colonial waterbirds and their habitat, which is a known risk factor. Because colonial waterbirds are all ground-nesters, they are highly vulnerable to direct human activities such as ORVs, pedestrians, photographers, and wildlife managers/scientists (Buckley and Buckley 1976; Erwin 1980, 2005). In particular, modest disturbances early in the spring when colonial waterbirds are first arriving and prospecting for breeding sites can be highly disruptive (Buckley and Buckley 1976). If surveying distance is too close (for example, less than 600 feet (Rogers and Smith 1995; Erwin 1989, 2005), it could lead to frequent flushing responses, which in turn could have the potential to negatively impact feeding, reproduction, resting, or other factors. Therefore, species surveying would likely have long-term, moderate adverse impacts on colonial waterbirds on an annual basis during the pre-nesting and nesting season.

Species management would be the same as in alternative A, except that ORV closures would provide for a 300-foot buffer around all nests if a backroad is present for ORV use, and a 150-foot buffer if there is no backroad. Active tern and skimmer nesting areas would be closed to ORV traffic. Increased enforcement would also be provided to ensure public compliance with closures. Species management would bring people and equipment into direct contact with colonial waterbirds and their habitat and these activities, as with surveying, are known risk factors (Buckley and Buckley 1976; Erwin 1980, 2005). Conversely, posting colonial waterbird nests with symbolic fencing would provide a deterrent to the entry of people, pets, and ORVs into their habitats. Therefore, species management would likely have long-term, minor to moderate adverse impacts on colonial waterbirds.

Predator exclosures and predator trapping would not occur. Predators are potentially key to the success of colonial waterbirds and other ground nesting birds. Therefore, the lack of a clear predator management plan would result in long-term, moderate to major adverse effects on colonial waterbirds.

Recreation Use. Recreation use would be the same as in alternative A but with the addition of the following: an ORV and camping closure of any area between 2 ramps that has 3 or more American oystercatcher pairs displaying courtship/mating behavior or nesting, and an increase to a 300-foot buffer or ORV closure around all colonial waterbird nests if a backroad is available for ORV use. As described in alternative A, ORVs would be prohibited year-round from Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit. ORVs would also be prohibited seasonally from the northern end of South Core Banks and from Middle Core and “Ophelia Banks.” Pedestrians and pets on leash would be allowed within these ORV closure areas.

The increased protection from ramp-to-ramp closures for American oystercatchers would also benefit colonial waterbirds. However, lack of consistency in applying closure protection to colonial waterbirds from recreation activities would result in negative impacts (such as direct damage to nests, eggs, or chicks, or flushing from the nest) that would be detectable, might be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable nesting sites. Impacts from recreation use are a concern because colonial waterbirds need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles and unleashed pets in or near their nesting habitat (NPS 2006). Because it is not clear how many colonial birds would benefit from expanded American oystercatcher ORV closures, frequent disturbance from recreation use would still be

expected resulting in adverse impacts on colonial waterbird reproduction and chick-feeding. Some of these impacts would occur during critical periods of reproduction within key colonial waterbird habitat and are known to result in direct mortality, abandonment of nest sites, or loss of habitat. Overall, the impact of recreation use under alternative C would be long-term, moderate to major and adverse.

Other Seashore Management. Under alternative C, outreach efforts would include all the elements of alternatives A and B but with the addition of 4 seasonal law enforcement rangers to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day, to relay information about species and closures. Use of law enforcement personnel in this role would assist with compliance. New and larger closure signs would be designed for birds and seabeach amaranth, and daily morning vehicle closure information would be posted to a map at ferry landings and to the seashore website. These outreach efforts would result in long-term, minor to moderate beneficial impacts on colonial waterbirds.

Established ORV and full recreational closures would be enforced during daytime hours up to 3 to 5 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island with the addition of 3 enforcement rangers. Nighttime enforcement would be the same as alternative B, occurring up to 4 nights per month throughout the seashore. This level of staffing would help mitigate impacts of emergency operations, and mandatory commitments to national emergency responses. Outreach staff at ferry landings and camps would also improve compliance, since visitors would know that enforcement staff are present on North Core Banks and South Core Banks. This presence and enforcement of compliance would result in long-term, minor to moderate beneficial effects on colonial waterbirds.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Impacts on colonial waterbirds would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Impacts related to past, current, and future actions at Cape Lookout National Seashore that could affect colonial waterbirds would be the same as outlined in alternative A. Overall, impacts from these other actions would be long-term, minor and adverse. These impacts, when combined with the major adverse impacts from recreational use at the seashore in alternative C, would result in long-term, moderate to major, adverse cumulative impacts on colonial waterbirds.

Conclusion

Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative C would likely to lead to long-term moderate adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Surveying activities under alternative D would be the same as described under alternatives A and C. Although surveying would result in data that would be beneficial for the species, surveying would bring people and equipment into direct contact with colonial waterbirds and their habitat and is a known risk factor. As noted previously, because colonial waterbirds are all ground-nesters, they are highly vulnerable to direct human activities such as ORVs, pedestrians, photographers, and wildlife managers/scientists (Buckley and Buckley 1976; Erwin 1980, 2005). In

particular, modest disturbances early in the spring when colonial waterbirds are first arriving and prospecting for breeding sites can be highly disruptive (Buckley and Buckley 1976). If surveying distance is too close (for example, less than 600 feet) (Rogers and Smith 1995; Erwin 1989, 2005), it could lead to frequent flushing responses, which in turn could have the potential to negatively impact feeding, reproduction, resting, or other factors. Therefore, species surveying would likely have long-term, moderate adverse impacts on colonial waterbirds on an annual basis during the pre-nesting and nesting season.

Species management would be the same as under alternative A except that beginning April 1 active colonial waterbird nesting areas would be closed to all recreation with symbolic fencing. Additionally, historical nesting areas used by terns and skimmers and any newly created nesting habitat areas would be closed to ORVs. Species management would bring people and equipment into direct contact with colonial waterbirds and their habitat and these activities, as with surveying, are known risk factors (Buckley and Buckley 1976; Erwin 1980, 2005). Conversely, posting colonial waterbird nests earlier in the nesting season would provide a deterrent to the entry of people, pets, and ORVs into their habitats. Therefore, species management would likely have long-term, minor to moderate adverse impacts on colonial waterbirds.

Predator exclosures and predator trapping would not be used for colonial waterbirds. Predators are potentially key to the success of colonial waterbirds and other ground nesting birds. Therefore, the lack of a clear predator management plan means that colonial waterbirds at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects on colonial waterbirds.

Recreation Use. Year-round and seasonal ORV closures would be the same as listed for alternative C. Full recreation closures would be implemented around nests similar to alternative A.

Lack of consistency in applying closure protection to colonial waterbirds from recreation activities would result in adverse impacts (such as direct damage to nests, eggs, or chicks, or flushing from the nest) and would be detectable, might be outside the natural range of variability, and could lead to permanent abandonment of otherwise suitable nesting sites. Impacts from recreation use are a concern because colonial waterbirds need large, undisturbed beach areas for successful nesting and they are particularly sensitive to pedestrians, vehicles, and unleashed pets in or near their nesting habitat (NPS 2006). Under alternative D it is not clear how many colonial waterbirds would benefit from management to control recreation use disturbance. Thus, frequent disturbance from recreation use could be expected, resulting in adverse impacts on colonial waterbird reproduction and chick-feeding. Some of these impacts also would occur during critical periods of reproduction and within key colonial waterbird habitat and are known to result in direct mortality, abandonment of nest sites, or loss of habitat. Overall, the impact of recreation use under alternative D would be long-term, moderate to major and adverse.

Other Seashore Management. Under alternative D, outreach efforts would include all the elements of alternative A with the addition of 4 interpretation staff to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day, to relay educational information about species and closures. Outreach efforts would result in long-term, minor to moderate beneficial impacts on colonial waterbirds.

Compliance with the established ORV and full recreational closures would be enforced as detailed under alternative A, with compliance monitoring occurring up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Night monitoring would not occur. Enforcement of compliance would have long-term, minor to moderate beneficial effects on colonial waterbirds.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Impacts on colonial waterbirds would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Impacts related to past, current, and future actions at Cape Lookout National Seashore that could affect colonial waterbirds would be the same as outlined in alternative A. Overall, impacts from these other actions would be long-term, minor and adverse. These impacts when combined with the major adverse impacts from recreational use at the seashore in alternative D would result in long-term, moderate to major, adverse cumulative impacts on colonial waterbirds.

Conclusion

Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on colonial waterbirds. Because protection measures for nesting colonial waterbirds and their habitat are inconsistently applied and entail some risks when they are applied, recreational use under alternative D would likely result in long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to colonial waterbirds at Cape Lookout National Seashore would not occur under alternative D.

WILSON'S PLOVER

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on Wilson's plover populations and habitat were evaluated based on available data on the species' past and present occurrence at Cape Lookout National Seashore as well as the species' association with humans, pets, predators, and ORVs. Information on habitat and other existing data were acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to wildlife from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. Under alternative A, no surveying activities for Wilson's plovers would occur during the nesting season, during migration, or while the birds are wintering within Cape Lookout National Seashore. Therefore, no new data would be collected to assist in better protection of the species. Wilson's plovers would be exposed to the disturbance associated with the surveying activities for those other species that are currently surveyed. This disturbance would include contact with people and equipment, which are known risk factors (Corbat and Bergstrom 2000). Wilson's plovers, like piping plovers, are highly vulnerable to direct human activities such as ORVs, pedestrians, pets, and managers/scientists (Corbat and Bergstrom 2000; NPS 2006). Staff would use best professional judgment and attempt to minimize disturbance during surveying. However, surveying has the potential to lead to frequent flushing responses, which in turn could have the potential to negatively impact feeding, reproduction, resting or other factors. Therefore, species surveying under alternative A would likely have long-term, minor adverse impacts on Wilson's plovers on an annual basis during the pre-nesting and nesting seasons.

In terms of species management, Wilson's plovers are not currently managed at Cape Lookout National Seashore unless they happen to co-occur within a buffer established for a species that is managed. Therefore, during nesting, only those Wilson's plover nests that fall within the closure of another species would be protected by full recreational or ORV closures. Foraging habitat in which adults or chicks might forage are not closed to any activity unless they happen to overlap areas closed for another species such as piping plover or American oystercatchers. Thus, species management would result in moderate adverse

impacts on Wilson's plovers, because protection through management would occur only to those nests that happen to appear within a closure for another species.

Predator exclosures and predator trapping are not used for Wilson's plover. Predators are potentially key to the success of this plover and other ground nesting birds. Therefore, the lack of a clear predator management plan means that Wilson's plovers at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects.

Recreation Use. Because Wilson's plovers commonly nest on beaches with wide berms, which are also favored by beachgoers, they are subject to disturbance at their nests and roosts by beachgoers, pets, and ORV traffic. Wilson's plovers leave their nests when disturbed and are extremely reluctant to return when intruders are anywhere near, thereby exposing eggs to predation and overheating (Corbat and Bergstrom 2000; NPS 2006). Because only those Wilson's plovers that happen to nest within a bird or turtle closure would be partially protected from recreation use, the impacts of recreation use on Wilson's plover would be long-term, moderate and adverse.

Other Seashore Management. Outreach efforts would include the distribution of informational brochures about the seashore's endangered species at the visitor center and providing the visiting public with educational materials through posted signs, site bulletins, interpretive programs, press releases notifying public of non-routine closures that affect ORV driving, and the Cape Lookout National Seashore website. No entrance station/education outreach would be performed under alternative A and little, if any, of the information transferred to the visiting public would pertain to Wilson's plovers. Therefore, outreach would have no effect or would be indirectly minor to moderate beneficial to Wilson's plovers in the long term.

Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A includes one supervisor, one field ranger, and two 6-month seasonal rangers, which together would provide compliance surveying up to 2 to 3 days per week in North Core Banks, South Core Banks, Shackleford Banks, and Middle Core/Harkers Island. Compliance would have minor to moderate beneficial effects on Wilson's plover. Compliance efforts would result in long-term, minor to moderate, beneficial impacts on Wilson's plover.

As described in the American oystercatcher and colonial waterbird sections, research activities under alternative A include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending upon the intensity, location, and timing of these research activities there may or may not be an effect on Wilson's plover. Overall, the predator removal study could have beneficial effects on Wilson's plovers because predators play such a substantial and harmful role in the breeding performance of ground-nesting species at Cape Lookout National Seashore. The visitor use study could benefit these species once more detailed information regarding visitor use patterns is available to resource managers.

Cumulative Impacts

Impacts from past, present, and other future actions would be the same as those described under alternative A for American oystercatchers and colonial waterbirds, and would result in long-term, minor, adverse impacts. These impacts in combination with the major adverse impacts from recreational use at the seashore under alternative A above would result in long-term, moderate to major, adverse cumulative impacts on Wilson's plovers.

Conclusion

Species surveying and management actions under alternative A would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term,

moderate to major, and adverse. Impairment on Wilson's plovers at Cape Lookout National Seashore would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Surveying activities would be the same as described under alternative A, except that surveying for Wilson's plovers would be initiated if they are observed during the surveying activities for piping plover. This would result in direct, yet modest, benefits gained from additional data that could help better protect the species. However, Wilson's plovers would be disturbed during the surveying activities for other birds, turtles, and plants. This disturbance would include contact with people and equipment, which are known risk factors to Wilson's plovers and their habitat (Corbat and Bergstrom 2000). Wilson's plovers, like piping plovers, are highly vulnerable to direct human activities such as ORVs, pedestrians, pets, and managers/scientists (Corbat and Bergstrom 2000; NPS 2006). Staff would use best professional judgment to minimize disturbance during surveying. However, the potential remains for surveying to cause frequent flushing responses, which in turn could negatively impact feeding, reproduction, resting, or other factors. Therefore, species surveying under alternative B would likely have long-term, minor adverse impacts on Wilson's plovers on an annual basis during the pre-nesting and nesting seasons.

The presence of Wilson's plover nests and scrapes found during piping plover surveying would be posted outside of existing closures on North Core Banks and South Core Banks under alternative B that include the permanent year-round ORV closures and the seasonal full recreational closure on the north end of South Core Banks. Middle Core Banks and "Ophelia Banks" would also be seasonally closed to ORVs. All other Wilson's plover nests would be protected only if they happen to be found within the closure of another species. For those Wilson's plovers inside piping plover closures, buffers would not be increased around their nests. Therefore, any Wilson's plovers that nest near the perimeter of full recreational or ORV closures for piping plover would have very minimal protection under alternative B. Foraging habitat in which Wilson's plover adults or chicks might forage would not be closed to any activity unless the habitat happens to co-occur in areas closed for other species such as piping plover or American oystercatchers. Species management would result in moderate adverse impacts on Wilson's plovers, because other than the protection on North Core Banks and South Core Banks and any other protection afforded by ORV closures such as on Middle Core and "Ophelia" Banks, the management applies only to those Wilson's plover nests that happen to co-occur within a closure for another species.

Predator exclosures and predator trapping would not be used for Wilson's plovers. Predators are potentially key to the success of Wilson's plovers and other ground nesting birds. Therefore, the lack of a clear predator management plan means that Wilson's plovers at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects.

Recreation Use. Because Wilson's plovers nest commonly on beaches with wide berms, which are also favored by beachgoers, they are subject to disturbance at their nests and roosts by beachgoers, pets, and ORV traffic. Wilson's plovers leave their nests when disturbed and are extremely reluctant to return when intruders are anywhere near, thereby exposing eggs to predation and overheating (Corbat and Bergstrom 2000; NPS 2006). Other than those nests found on North Core Banks and South Core Banks and in the seasonal full recreational closure on the north end of South Core Banks, only those Wilson's plover nests within a full recreational or ORV closure for bird or turtle nests would be very minimally protected from recreation use, resulting in long-term, moderate adverse impacts.

Other Seashore Management. Outreach efforts would include all the elements of alternative A with the addition of two law enforcement rangers to be stationed at Long Point and Great Island ferry landings. The rangers would be responsible for contacting all ORV users entering the seashore 4 days out of 7 per week, 10 hours per day to relay information about species, closures, and pet leash or prohibition

regulations. Use of law enforcement staff in this role would assist with compliance. These outreach efforts would result in long-term, minor to moderate beneficial impacts on Wilson's plovers.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, requiring one supervisor, one field ranger and two 6-month seasonal rangers, who, together, would monitor compliance up to 2 to 3 days per week (see alternative A). Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the two rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have long-term, minor to moderate beneficial impacts on Wilson's plover.

Other seashore management includes those research efforts detailed under alternative A: an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Impacts on Wilson's plovers would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Cumulative impacts under alternative B would be the same as those under alternative A. Impacts from other actions would be long-term, minor and adverse, which when combined with the major adverse impacts from recreational use at the seashore under alternative B, would result in long-term, moderate to major, adverse cumulative impacts on Wilson's plovers.

Conclusion

Species surveying and management actions under alternative B would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Surveying activities would be the same as in alternative B. These activities would lead to direct, yet modest, benefits to some Wilson's plovers from collected data that could improve species protection. However, Wilson's plovers would be disturbed by surveying activities for other birds, turtles, and plants at the seashore. This disturbance would include contact with people and equipment, which are known risk factors to Wilson's plovers and their habitat (Corbat and Bergstrom 2000). Wilson's plovers, like piping plovers, are highly vulnerable to direct human activities such as ORVs, pedestrians, pets, and managers/scientists (Corbat and Bergstrom 2000; NPS 2006). Staff would use best professional judgment to minimize disturbance during surveying. However, surveying activities have the potential to cause frequent flushing responses, which in turn could negatively impact feeding, reproduction, resting, or other factors. Therefore, species surveying under alternative C would have long-term, minor adverse impacts on Wilson's plovers on an annual basis during the pre-nesting and nesting seasons.

Species management would be the same as under alternative A during pre-nesting and courtship, but similar to alternative B during nesting. Any Wilson's plover nests and scrapes found during piping plover surveying would be posted outside of existing ORV and full recreational closures on North Core Banks and South Core Banks, and other nests would be protected if they are found within the closure of another species. For those Wilson's plovers inside piping plover closures, buffers would not be increased around their nests. Therefore, any Wilson's plovers that nest near the perimeter of closures for piping plovers would have very minimal protection. Foraging habitat in which adults or chicks might forage would not be closed to any activity unless they happen to co-occur in areas closed for other species such as piping

plover or American oystercatchers. Species management would result in moderate adverse impacts on Wilson's plovers, because other than the protection on North Core Banks and South Core Banks and limited protection afforded by other ORV closures, the management applies only to those Wilson's plover nests that happen to co-occur within a closure for another species.

Predator exclosures and predator trapping would not be used for Wilson's plovers. Predators are potentially key to the success of these and other ground nesting birds. Therefore, the lack of a clear predator management plan means that Wilson's plovers at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects.

Recreation Use. Recreation use and the associated impacts under alternative C would be the same as those described in alternative B. Other than those nests found on North Core Banks and South Core Banks and in the seasonal and permanent ORV closures throughout the seashore, only those Wilson's plovers that happen to nest within full recreational or ORV closures for birds or turtles would be very minimally protected from recreation use. Thus, the impacts on Wilson's plovers from recreation use would be long-term, moderate and adverse.

Other Seashore Management. Under alternative C, outreach efforts would include all the elements of alternatives A and B but with the addition of 4 seasonal law enforcement rangers to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay information about species and closures. Use of law enforcement personnel in this role would assist with compliance. New and larger closure signs would be designed for birds and seabeach amaranth and daily morning vehicle closure information would be posted to a map at the ferry landings and to the seashore website. These outreach efforts would result in long-term, minor to moderate beneficial effects on Wilson's plovers.

Established ORV and full recreational closures would be enforced during daytime hours up to 3 to 5 days per week with the addition of 3 enforcement rangers. Nighttime enforcement would be the same as alternative B, occurring up to 4 nights per month throughout the seashore. Outreach staff at ferry landings and camps would also improve compliance, since visitors would know that enforcement staff are present on North Core Banks and South Core Banks. This presence and enforcement of compliance would result in long-term, minor to moderate beneficial impacts on Wilson's plovers.

Other seashore management includes those research efforts detailed under alternative A. Impacts on Wilson's plovers would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Cumulative impacts under alternative C would be the same as those under alternative A. Impacts from other actions would be long-term, minor and adverse, which when combined with the major adverse impacts from recreational use at the seashore under alternative C, would result in long-term, moderate to major, adverse cumulative impacts on Wilson's plover.

Conclusion

Species surveying and management actions under alternative C would result in minor to moderate long-term adverse impacts on the Wilson's plovers. Because protection measures for nesting Wilson's plovers and their habitat are both inconsistently applied and entail some risks when they are applied, recreational use is likely to lead to long-term major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Surveying activities would be the same as under alternatives B and C and would lead to direct, yet modest benefits to some Wilson's plovers as a result of the data collected. Wilson's plovers would be exposed to the disturbance associated with the surveying activities for other birds, turtles, and plants that are currently surveyed. This disturbance would include contact with people and equipment, which are known risk factors to Wilson's plovers and their habitat (Corbat and Bergstrom 2000). Wilson's plovers, like piping plovers, are highly vulnerable to direct human activities such as ORVs, pedestrians, pets, and managers/scientists (Corbat and Bergstrom 2000; NPS 2006). Disturbance to Wilson's plovers from contact during surveying is unknown because it is not clear how much disturbance would result from the surveying of other species. Surveying impact has the potential to lead to frequent flushing responses, which in turn could have the potential to negatively impact feeding, reproduction, resting, or other factors. Therefore, species surveying under alternative D would likely have long-term, minor adverse impacts on Wilson's plovers on an annual basis during the pre-nesting and nesting seasons.

Species management would be the same as under alternative A during pre-nesting and courtship, but similar to alternatives B and C during nesting. The presence of Wilson's plover nests and scrapes found during piping plover surveying would be posted outside of existing closures on North Core Banks and South Core Banks. All other Wilson's plover nests would be protected only if they happen to be found within the closure of another species. For those Wilson's plovers inside piping plover closures, buffers would not be increased around their nests. Therefore, any Wilson's plovers that nest near the perimeter of piping plover closures would have very minimal protection under alternative D. Foraging habitat in which adult or chicks might forage would not be closed to any activity unless the habitat happens to co-occur in areas closed for other species such as piping plover or American oystercatchers. Species management would result in moderate adverse impacts on Wilson's plovers, because other than the protection on North Core Banks and South Core Banks and limited protection afforded by ORV closures, the management applies only to those Wilson's plover nests that happen to co-occur within a closure for another species.

Predator exclosures and predator trapping would not be used for Wilson's plovers. Predators are potentially key to the success of Wilson's plovers and other ground nesting birds. Therefore, the lack of a clear predator management plan means that Wilson's plovers at Cape Lookout National Seashore would be expected to have long-term, moderate to major adverse effects.

Recreation Use. Recreation use would be the same as described under alternative B. Other than those nests found on North Core Banks and South Core Banks and in permanent or seasonal ORV closures, only those Wilson's plovers that happen to nest within a closure implemented to protect birds or turtles would be very minimally protected from recreation use. Thus, the impacts of recreation use on Wilson's plover would be long-term, moderate and adverse.

Other Seashore Management. Under alternative D, outreach efforts would include all the elements of alternative A with the addition of 4 interpretation staff to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day, to relay educational information about species and closures. Outreach efforts would result in long-term, minor to moderate beneficial impacts on Wilson's plovers.

Compliance with the established ORV and full recreational closures would be enforced as detailed under alternative A, with compliance monitoring occurring up to 2 to 3 days per week. Night monitoring would not occur. Enforcement of compliance would have long-term, minor to moderate beneficial impacts on Wilson's plovers.

Other seashore management includes those research efforts detailed under alternative A. Impacts on Wilson's plovers would be dependent on the outcome of the studies as outlined in alternative A.

Cumulative Impacts

Cumulative impacts under alternative D would be the same as those under alternative A. Impacts from other actions would be long-term, minor and adverse, which when combined with the major adverse impacts from recreational use at the seashore under alternative D, would result in long-term, moderate to major, adverse cumulative impacts on Wilson's plovers.

Conclusion

Species surveying and management actions under alternative D would result in minor to moderate long-term adverse impacts on Wilson's plovers. Lack of a predator management plan for species protection would result in long-term moderate to major adverse impacts. Cumulative impacts would be long-term, moderate to major, and adverse. Impairment to Wilson's plover at Cape Lookout National Seashore would not occur under alternative D.

RED KNOT

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on red knot populations and habitat were evaluated based on available data, on the species' past and present occurrence at Cape Lookout National Seashore, as well as the species' association with humans, pets, predators, and ORVs. Information on habitat and other existing data were acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to wildlife from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Species Surveying and Management. The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts are very limited. Red knots would not be surveyed nor would other management activities, such as predator control or trapping, be implemented on behalf of the red knot at Cape Lookout National Seashore under alternative A. In addition, surveying for other species would not affect red knots. Therefore, these activities would result in long-term negligible adverse impacts on red knots.

Neither would red knots be managed at Cape Lookout National Seashore under alternative A. However, management activities for other species would result in long-term, minor adverse impacts on red knots.

Recreation Use. Recreation activities that occur in these months when red knots are in residence on beaches in Cape Lookout National Seashore could potentially impact resting and foraging red knots. For example, it is possible that ORV activity and/or other recreation (including pedestrians and pets) that takes place within or near to red knot resting and feeding sites could cause red knots to flush more often than they would without these activities, resulting in red knots sacrificing time spent feeding and resting for time spent fleeing. These impacts would be long-term, minor and adverse because red knots rest and feed at the seashore only during the fall and winter when recreation use is at its lowest.

Other Species Management. Outreach, compliance, and research activities outlined in alternative A for other listed bird species, such as the Wilson's plover, would be the same for the red knot. All these activities would have negligible long-term adverse impact on red knots.

Cumulative Impacts

The past, present, and future actions discussed under the cumulative impact scenario could be expected to have a range of impacts on the red knot. The dredging activity in Beaufort Inlet could have short-term moderate adverse impacts if it occurred during wintering, and maintenance dredging could result in long-term habitat building that could be minor beneficial to the overwintering/foraging of red knots. Impacts would depend on the timing and duration of the maintenance dredging of the Beaufort Inlet Channel as well as upon the type and placement of the dredge spoils.

Recreation has resulted and would continue to result in both long- and short-term and direct and indirect impacts that are moderately adverse to the red knot at Cape Lookout National Seashore. The direct impacts from recreational use include the abandonment of nests due to disturbance from ORVs, pets, and pedestrians.

The horse management plan, concessionaires and ferry operations, and the comprehensive interpretation plan would all have negligible impact on red knots.

Several of the local and NPS past, current, and future planning efforts can also affect locally sensitive bird species. The outcome of the current action to develop a Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA would have a direct, short-term impact on locally sensitive bird species which can move back and forth during nesting, migration, and overwintering. However, whether the impact of the interim strategy would be beneficial or adverse to these species would depend upon the management decisions that are made and ultimately implemented.

Other future planning efforts include the development of a long-term ORV management plan/EIS for both Cape Lookout National Seashore and Cape Hatteras National Seashore. The plan/EISs would have a direct, long-term impact on locally sensitive bird species which nest, migrate, and overwinter in Cape Lookout National Seashore. However, whether the impact of these two ORV plans would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented. The outcome of the Cape Lookout National Seashore long-term ORV management plan/EIS would have a direct, long-term impact on locally sensitive bird species which can move back and forth during nesting, migration and overwintering. However, whether the impact of the long-term ORV management plan/EIS would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are made and ultimately implemented.

Finally, the Cape Lookout National Seashore Predator Study could be significant because predators play such a substantial and deleterious role in the breeding performance of locally sensitive bird species at Cape Lookout National Seashore. However, whether the impact of the Predator Study would be beneficial or adverse to locally sensitive bird species would depend upon the management decisions that are implemented.

Cumulative impacts from these other actions would be long-term, minor and adverse. These impacts when combined with the impacts on red knots in alternative A would result in long-term minor adverse cumulative impacts.

Conclusion

The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be limited. Since red knots rest and feed only during the fall and winter when recreation use is low, impacts from recreational use would be long-term, minor and adverse. Cumulative impacts would also be long-term, minor and adverse. Impairment to red knots would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Species Surveying and Management. Red knots would be surveyed under alternative B according to protocols for surveying wintering piping plover and other shorebirds that are under development by the NPS Inventory and Monitoring Program. These surveying activities would be negligible to red knots at Cape Lookout National Seashore.

Red knots would not be managed under alternative B. Management activities implemented for other species at the seashore would have long-term minor adverse impacts on red knots, as these actions take place during the spring, summer, and early-fall when red knots are in residence at Cape Lookout National Seashore. However, summer use is only occasional.

Recreation Use. Recreation activities that occur when red knots are in residence on beaches in Cape Lookout National Seashore have the potential to impact resting and foraging red knots. For example, it is possible that ORV activity and/or other recreation activities engaged in by pedestrians and pets (when not prohibited) within or near to red knot resting and feeding sites could cause red knots to flush more often than they would without these activities, resulting in red knots sacrificing time spent feeding and resting for time spent fleeing. These impacts would be long-term, minor and adverse.

Other Seashore Management. Outreach, compliance, and research activities would be the same as outlined in alternative B for Wilson's plovers. All these activities would have negligible long-term adverse impact on red knots.

Cumulative Impacts

Cumulative impacts would be the same as those in alternative A. The long-term, minor adverse impacts of the other actions when combined with the impacts on red knots in alternative B would result in long-term minor adverse cumulative impacts.

Conclusion

The red knot is a winter, fall, spring, and occasional summer visitor at the seashore; therefore, impacts would be very limited. Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse. Cumulative impacts would also be long-term, minor and adverse. Impairment to red knots would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Species Surveying and Management. Red knots would be surveyed according to protocols for surveying wintering piping plover and other shorebirds that are under development by the NPS Inventory and Monitoring Program as described in alternative B. These surveying activities would have negligible impacts on red knots.

Red knots would not be managed under alternative C at Cape Lookout National Seashore. Management activities for other species would have long-term negligible impacts on red knots.

Recreation Use. As discussed in alternatives A and B, recreation activities that would occur when red knots are in residence on beaches in Cape Lookout National Seashore would result in minor adverse impacts on resting and foraging red knots. Under alternative C, there would be no year-round closures to key winter habitat. Therefore, impacts would be long-term, minor and adverse, similar to alternative A.

Other Species Management. Outreach, compliance, and research activities would be the same as outlined in alternative C for Wilson's plover. All these activities would have negligible long-term adverse impact on red knots.

Cumulative Impacts

Cumulative impacts would be the same as in alternative A. The long-term minor adverse impacts of those other actions when combined with the impacts of alternative C would result in long-term minor adverse cumulative impacts on red knots.

Conclusion

The red knot is a winter, fall, spring, and occasional summer visitor at the seashore, and impacts would be very limited. Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse. Cumulative impacts would also be long-term, minor and adverse. Impairment to red knot would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Species Surveying and Management. Red knots on North Core Bank and South Core Banks would be surveyed under alternative D according to protocols for surveying wintering piping plover and other shorebirds that are under development by the NPS Inventory and Monitoring Program. These surveying activities would have negligible impacts on red knots.

Red knots would not be managed under alternative D at Cape Lookout National Seashore and management activities for other species would have long-term negligible impacts on red knots.

Recreation Use. As with the other alternatives, recreation activities that occur in the months when red knots are in residence on beaches in Cape Lookout National Seashore have the potential to impact resting and foraging red knots. Under alternative D, there would be no year-round closures to key habitat. Therefore, impacts would be similar to alternative A, long-term, minor and adverse.

Other Seashore Management. Outreach, compliance, and research activities would be the same as outlined in alternative D for Wilson's plover. All of these activities would have negligible long-term adverse impacts on red knots.

Cumulative Impacts

Cumulative impacts would be the same as in alternative A. The long-term minor adverse impacts of those other actions when combined with the impacts of alternative D would result in long-term minor adverse cumulative impacts on red knots.

Conclusion

The red knot is a winter, fall, spring and occasional summer visitor at the seashore, and impacts would be very limited. Since red knots rest and feed only during the fall and winter when recreation use is at its lowest, impacts from recreational use would be long-term, minor and adverse. Cumulative impacts would also be long-term, minor and adverse. Impairment to red knots would not occur under alternative D.

OTHER WILDLIFE AND WILDLIFE HABITATS

Wildlife potentially affected by the proposed alternatives include mammalian predators, such as raccoon; invertebrate species that inhabit the intertidal sand flats, wrack line, and moist substrate habitat; and other bird species that use the same habitat as the species identified for protection under this proposed strategy.

GUIDING REGULATIONS AND POLICIES

Service-wide NPS regulations and policies, including the NPS Organic Act of 1916, NPS *Management Policies 2001* (NPS 2000a), and the NPS Reference Manual 77, Natural Resource Management also direct national parks to provide for the protection of park resources. The Organic Act directs national parks to conserve wildlife unimpaired for future generations and is interpreted to mean that native animal life are to be protected and perpetuated as part of a park unit's natural ecosystem. Parks rely on natural processes to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. The NPS *Management Policies 2001* state that the NPS would maintain as parts of the natural ecosystems of parks all native plants and animals (sec. 4.4.1). The NPS would achieve this by

- preserving and restoring the natural abundance, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and communities and ecosystems in which they occur
- restoring native plant and animal populations in parks when they have been extirpated by past human-caused actions
- minimizing human impacts on native plants, animal populations, communities, and ecosystems, and the processes that sustain them

Policies in the NPS *Natural Resources Management Guidelines* state, "the National Park Service will seek to perpetuate the native animal life as part of the natural ecosystem of parks" and that "native populations will be protected against . . . destruction . . . or harm through human actions."

GENERAL METHODOLOGY AND ASSUMPTIONS

This section focuses on those species that may potentially be impacted by the actions described in the proposed alternatives and is, therefore, directed towards specific wildlife, including invertebrates and other bird species. The analysis is organized according to those two wildlife types. Although, the proposed alternatives have a direct impact on non-native mammalian predators within the seashore, these impacts are addressed under the individual protected species management sections and within the other bird species section that follows. Cape Lookout National Seashore will be researching management of predator species and the resulting impact on protected species working with the U.S. Geological Survey.

Study Area

The study area for assessment of the four alternatives, as well as the cumulative impacts is the seashore.

IMPACT THRESHOLDS

The following thresholds for the impacts on wildlife and wildlife habitat were defined:

- | | |
|--------------------|--|
| <i>Negligible:</i> | There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations. |
|--------------------|--|

<i>Minor Adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but would not be outside the natural range of variability. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors might occur. However, some impacts might occur during critical reproduction periods for a protected species, but would not result in injury or mortality. Sufficient habitat in the seashore would remain functional to maintain the viability of the species in the seashore.
<i>Minor Beneficial:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but would not be outside the natural range of variability. Improvements to key characteristics of habitat in the seashore would sustain or slightly improve existing population levels, population structure, or other factors and maintain the viability of the species.
<i>Moderate Adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Frequent responses to disturbance by some individuals could be expected, with some negative impacts on feeding, reproduction, resting or other factors affecting local population levels. Some impacts might occur during critical periods of reproduction or in key habitats in the seashore and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers or habitat in the seashore would remain functional to maintain the viability of the species in the seashore.
<i>Moderate Beneficial:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Changes to key characteristics of habitat in the seashore during critical periods of reproduction would minimize or prevent harassment or injury to one or more individuals and improve the viability of the species in the seashore.
<i>Major Adverse:</i>	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, would be expected to be outside the natural range of variability, and would be permanent. Frequent responses to disturbance by some individuals would be expected, with negative impacts on feeding, reproduction, or other factors resulting in a decrease in seashore population levels. Impacts would occur during critical periods of reproduction or in key habitats in the seashore and result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large declines.
<i>Major Beneficial:</i>	Impacts on native species, their habitats in the seashore, or the natural processes sustaining them would be detectable, would be expected to be outside the natural range of variability, and would be permanent. Changes during critical periods of reproduction or in key habitats in the seashore would prevent mortality or loss of habitat and would result in notable increases in seashore population levels.

Duration: Short-term effects would be 1 to 2 breeding seasons for bird species and 1-2 years for invertebrates. Long-term effects would be anything beyond 2 breeding seasons. Under all alternatives, long-term effects may occur to any species well beyond the life of the interim protected species strategy, depending on the outcome of the long-term ORV management plan.

INVERTEBRATES

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Many of the protected bird species found within the seashore feed upon invertebrates found in the wrack, the intertidal sand flats, the moist sands of the island spits such as Cape Lookout Point, and the high energy intertidal zone. Because ORV use also occurs in these habitats, the impacts of ORVs on the invertebrate populations within these habitats were evaluated. Data used in the analysis was collected from available literature and seashore staff. Though a number of studies in the United States and internationally have investigated ORV impacts on invertebrates found on sandy beaches, the studies have focused on a relatively small number of species, and only a few of the studies have occurred on beaches in the southeastern United States that would have similar species to the beaches of Cape Lookout National Seashore. Comprehensive studies within Cape Lookout National Seashore have not been conducted to determine the species composition and abundance of invertebrates within the bird foraging habitat, though Wolcott and Wolcott (1984) did study the impacts of ORVs on the three major macroinvertebrates: the mole crab (*Emerita talpoida*), coquina clam (*Donax variabilis*), and ghost crab (*Ocypode quadrata*). As a result, there is not sufficient information available to assess the impact of ORVs on all of the invertebrate species inhabiting the wrack, intertidal sand flats, island spits, and the high-energy intertidal zone at Cape Lookout National Seashore. Therefore, impacts on invertebrates are discussed in general, and where possible, impacts on species specific to Cape Lookout National Seashore are discussed.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Impacts on small invertebrate populations are not well known. At Cape Cod National Seashore, attempts to determine whether ORVs impact these populations were unsuccessful because the high variability within the sample areas masked any correlation with vehicle impacts (Leatherman and Godfrey 1979).

ORVs operating within the intertidal zone sink into the firm sand a tenth of an inch or so (Wolcott and Wolcott 1984), and it has been shown that in most cases invertebrates inhabiting the intertidal zone that burrow into the sand when the tide is out are generally unaffected or only minimally affected by ORV traffic, regardless of the intensity of use. A study in South Africa found that the gastropod (*Bullia rhodostoma*), the clams (*Donax serra* and *Donax sordidus*), and the benthic mysid (*Gastrosaccus psammodytes*) showed a high tolerance for ORV traffic (van der Merwe and van der Merwe 1991). These species normally occupy the top 0.8 inches of sand, and generally are not found below a depth of 4 inches. With 50 vehicles passes fewer than 10% of the animals were damaged. At Cape Lookout National Seashore, Wolcott and Wolcott (1984) studied the impact of ORVs on coquina clams, mole crabs, and ghost crabs. They found that coquina clams and mole crabs, both of which reside below the sand surface when the tide is out, are immune to ORV damage. They also found that when ghost crabs are in their sand burrows during the day, they are not impacted by ORVs, even if they are only 2 inches below the surface.

However, ghost crabs are largely nocturnal and come out of their burrows to feed in the intertidal zone at night. The Wolcott and Wolcott study (1984) conducted at Cape Lookout National Seashore found that the crabs have no effective escape response when caught in a vehicle's headlights and are easily crushed by the ORVs. An average of 77 crabs were killed per 0.6 miles of intertidal zone during the study. During a peak period of crab activity, over 500 crabs were killed by a single vehicle pass over a distance of 1.2

miles. Due to the large ghost crab population at Cape Lookout National Seashore, estimated to be 10,000 crabs per 0.6 miles, and the relatively low level of night driving at the time of the study, 0.25 vehicles per 0.6 miles, the authors concluded that if night driving intensity remained unchanged, the impact on the ghost crab population would be negligible. However, they also concluded that even modest amounts of beach driving at night (20 – 50 vehicles driving along the intertidal zone) during the crabs' active season (April – November) would substantially reduce the ghost crab population (Wolcott and Wolcott 1984).

Several other studies show correlations between ghost crab populations and the amount of vehicle traffic. At Back Bay National Wildlife Refuge in Virginia a ten-fold difference in numbers was found between ORV use areas and nearby control areas where ORVs were prohibited, and at Chincoteague National Wildlife Refuge only one-thirteenth as many ghost crab burrows were found on a beach heavily used by ORVs as on nearby control areas. While these studies did not investigate causative effects, due to the circumstances surrounding night driving at these locations, "it seems reasonable to conclude that the observed population differences were due to the fraction of ORV use occurring after dark" (Wolcott and Wolcott 1984).

Invertebrates inhabiting the softer more protected intertidal sand and mud flats are not immune from ORV impacts. During studies conducted on populations of sand-flat invertebrates at Cape Cod National Seashore it was found that various animals, particularly amphipods (*Talorchestia*), numbered fewer in sand-flats where driving occurred (Leatherman and Godfrey 1979). The study also found polychaete worm (clam worm) populations and soft-shell clam (*Mya arenaria*) populations were decimated after 50 vehicle passes per day over 20 days through experimental plots. This is not unexpected, though, as the substrate is softer than the intertidal zone so ORVs would sink further and the soft-bodied organisms would be susceptible to physical compression.

ORVs can also impact the wrack line. Steinback (in prep) studied ORV impacts on sandy beaches in and around the wrack line at Cape Cod National Seashore, and found the number of animals on beaches where driving was permitted to be 30 – 50% lower than on beaches where driving was prohibited. The wrack line contains amphipods, beetles, mites, worms, flies and spiders, some which are very susceptible to drying out in various stages of their life history, and when a vehicle drives over the wrack line, it breaks it up, causing it to dry out.

ORVs could also impact invertebrate populations by altering or disrupting the normal foraging behavior of bird species. As ORVs drive along the beach, they disturb foraging birds and cause them to leave the areas where they were feeding. Though the birds normally return to foraging in a new location, some areas of heavy ORV use may actually decrease the foraging pressure on invertebrates by continually disrupting bird-feeding behavior in those locations. However, more study would be needed in this area to draw any conclusions, as it is currently not known what, if any impact, bird foraging has on invertebrate populations.

ORV traffic is prohibited year round from all of Shackleford Banks, Power Squadron Spit, Portsmouth Flats, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B. Therefore, there would be no impacts on invertebrates from recreation use and naturally occurring population levels would be maintained. The majority of the soft-bodied invertebrates that are most susceptible to ORV impacts reside in the mudflats rather than the oceanside intertidal zone. This area is not typically accessed by seashore visitors, whether on foot or in a vehicle, and would therefore be protected from any adverse impacts due to recreation use.

Outside of the year-round ORV closures there would be no protection of the wrack line, intertidal zone or sand flats from ORV use other than what is included in the ORV or full-recreational closures established for protected species. At Cape Lookout National Seashore there is an extensive backroad system on the landward side of the primary dune line that is available for vehicle traffic, though the extent of its use compared to ocean beach driving is not known. The typical ORV use pattern within Cape Hatteras National Seashore is to drive on the upper beach, above the high tide line (Hargrove 2005). It is likely that

this location is also preferred at Cape Lookout National Seashore when vehicles are using the ocean beach rather than the backroad system. Though vehicles normally drive above the high tide line on the ocean beach, when they reach their destination they drive into the intertidal zone and seashore. Depending on their location and size as well as the current tide height, some closures may force vehicles to drive in the intertidal zone to circumnavigate the closure. While driving in the intertidal zone would likely have a negligible impact on invertebrates, it requires the ORV to cross over the wrack line, which would disperse it and cause adverse impacts. It is not possible to determine an impact for the entire seashore of vehicles driving through the wrack, for the width of the beaches and location of species closures are constantly changing from year to year, so it is not known what percentage of the overall wrack would be disturbed by ORV traffic.

In those areas that require ORVs to frequently drive through the wrack due to closures established for protected species, the impact on invertebrates within the wrack would be long-term moderate to major adverse. There are six turtle nest relocation areas, three each on South Core Banks and North Core Banks, which are up to 1 mile in length. Each area is closed seasonally to ORV traffic from approximately 10 days before the first turtle nest hatching within an area until the last nest has hatched. This time period is highly variable, but could last anywhere from some time in June until the beginning of November depending upon when nests are relocated to or are naturally laid in the area. During the time period when these areas are closed to ORVs, the impacts on the wrack line would be short-term moderate beneficial; however, when they are reopened to ORV traffic the impacts would become adverse. It is also not known what level of use the intertidal sand flats currently receives or would receive from ORVs under alternative A. However, even 50 vehicle passes per day would likely cause long-term major adverse impacts on the invertebrate populations within this habitat.

In 1994 Schofield (1995) investigated nighttime vehicle use impacts on sea turtle nesting at the seashore. At the time the study was conducted, nighttime vehicle use was relatively low, with 4 to 13 vehicles using the ocean beach on South Core Banks during the turtle nesting season (May through August). Wolcott and Wolcott (1984) found that similarly low nighttime use had little impact on the ghost crab population of the seashore due to the large size of the ghost crab population. They also concluded that if the low levels of night driving remained unchanged, the impact on the ghost crab population would be negligible. However, they also concluded that even 20 to 50 vehicles driving at night could substantially impact ghost crab populations. It is not possible to determine if nighttime driving at the seashore is impacting the ghost crab population, for even though recreation visitor use at the seashore has more than doubled from 1994 to 2004 (NPS 2005c), it is not known what the current nighttime use is, or if the amount of nighttime use has increased since 1994. A visitor use study by East Carolina University scheduled for 2006 would examine nighttime ORV use in the seashore.

Cumulative Impacts

Other past, current, and future planned actions within and around Cape Lookout National Seashore have the potential to impact invertebrates. The dredging of Beaufort Inlet has occurred in the past and would continue to occur on an annual basis in the future. While the actual dredging would impact benthic invertebrates within the channel, it would not directly or indirectly impact invertebrates within the sandy beach habitat of the seashore.

Limited concessionaire services are offered, and would continue to be offered at Cape Lookout National Seashore. Services offered include rental cabins at the Long Point and Great Island ferry landings. Two vehicle/passenger ferries enable the public to transport their vehicles to both South Core Banks and North Core Banks. These services provide access to the seashore for both day and overnight use and substantially increase the amount of recreation use that occurs at the seashore. Recreation use has resulted and would continue to result in impacts that are short-term to long-term negligible to moderate impacts on the various marine invertebrates inhabiting the wrack and the moist sand of the island spits and intertidal

zone of Cape Lookout National Seashore. The impacts of recreational use are addressed above under alternative A and include crushing individual animals and disturbing/dispersing the wrack line.

Several of the local and NPS past, current, and future planning efforts can also affect the marine invertebrates in the sand flats and intertidal zones. Future stabilization of historic structures within the seashore would entail a beach re-nourishment project for stabilizing the soundside shore adjacent to the Cape Lookout Lighthouse. This project is proposed for protection of the Cape Lookout Lighthouse and associated historic structures. During re-nourishment beach invertebrate populations are greatly reduced or eliminated in the short-term by burial under tons of sand. However, recovery of the species is dependent on several factors. Most species that inhabit the intertidal zone and are recruited from pelagic larval stocks, such as the mole crabs and coquina clams, would recover quickly (several months) if nourishment activity ends before larval recruitment begins in the spring (USFWS 2000). For ghost crabs the recovery period would be longer. The type of sediment used for beach nourishment could affect the recovery of species as well. If the sediment used is dissimilar to that of the existing beach then it would have long-term adverse impacts. Another factor to consider is the frequency of maintenance. Many beaches need to be routinely maintained with beach nourishment projects. If the frequency were shorter than the recovery period of the invertebrate species then there would be long-term major adverse impacts. However, the area of the proposed project is fairly small, so while the impact on the immediate area could have a short- to long-term major impact, the overall effect on the entire seashore would be short- to long-term negligible to minor adverse or beneficial depending upon the timing, extent, and frequency of the re-nourishment, as well as the sediment characteristics.

The upcoming Cape Lookout National Seashore long-term ORV management plan/EIS, would address ORVs and, especially because of the documented risks that ORVs pose to some marine invertebrate species inhabiting the sand flats and intertidal zone, these plans would have long-term, direct impacts on marine invertebrates at Cape Lookout National Seashore. However, the impacts are indeterminate at this time and would depend on the policies developed with regards to where within the seashore ORVs would be allowed to go and during what time of day and year.

In the future the seashore would develop a Comprehensive Interpretation Plan that would further articulate the seashore's purpose, significance, and themes. It is necessary to inform/guide the seashore's interpretive and education programs, which includes information about threatened and endangered species within the seashore. It is indeterminate at this time whether or not this plan would impact invertebrates. One way it could provide long-term benefits to invertebrates is if it educates the public about the importance of preserving the wrack line.

The overall cumulative impact of these past, current and future actions, along with the actions under this alternative, would be short- to long-term negligible to moderate adverse depending upon the individual species of marine invertebrate.

Conclusion

ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative A. Continuing to prohibit ORV traffic from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Though driving in the intertidal zone outside of these areas would have negligible impacts, doing so would require driving across wrack lines. In areas where there is continual disruption of the wrack line there would be long-term moderate adverse impacts on the invertebrate population inhabiting this area, though the extent to which the wrack would be disturbed throughout the entire seashore is indeterminate at this time. To the extent that ORVs drive on softer intertidal sand flats, there would be long-term moderate impacts on soft-bodied animals, for even relatively few vehicle passes can decimate the animals. Though current levels of nighttime driving are not known, given the limited amount of night use in the past, the availability of the backroad network system, and the limited accessibility of the seashore to vehicles, allowing night driving

would cause long-term negligible adverse impacts on the ghost crab population. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would continue to result in long-term negligible to moderate adverse impacts on invertebrates in the seashore depending upon the species. Though some of the ORV impacts on invertebrates would be long-term moderate adverse, the impacts would not be at a level that would threaten the existence of the invertebrate populations within the entire seashore. Invertebrate populations at the seashore would not be impaired under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Under alternative B the enhanced protection measures for the protected species would also greatly enhance the protection of the invertebrates. The year-round and seasonal (i.e., turtle nest relocation areas) ORV closures under alternative A would continue to provide protection for invertebrates. Closing key piping plover migratory/wintering habitat to ORV would allow invertebrate populations to recover to natural abundance levels and would provide long-term moderate beneficial effects on all invertebrate species inhabiting these areas, including any soft-bodied animals and species inhabiting the wrack. Closing Middle Core Banks and “Ophelia Banks” to ORVs from April 1 to August 31, as well as the full-recreational closure along the northern 2 miles of South Core Banks during the piping plover breeding season, would provide short-term minor to moderate beneficial effects; however, once the areas were reopened, the impacts would become adverse as the wrack line would no longer be protected. Increasing the number of ramp to ramp ORV closures for the American oystercatcher would provide short-term minor to moderate benefits for invertebrate species inhabiting the wrack within these areas. Ghost crabs are active from April to November and mortality due to ORVs generally only occurs from night driving; therefore, prohibiting night driving from May 1 until the last turtle nest hatches in the area between Ramp 41B and Ramp 44 and encouraging the use of backroads at night throughout the seashore would provide long-term minor to moderate benefits (depending on the current level of impact). Outside of the closures, some of the wrack line may still be impacted by ORV use as beach widths and the potential expansion of closures, including the protection of potential seabeach amaranth habitat, may force ORVs to drive lower in the intertidal zone than would normally occur. The extent to which disturbance would occur within the entire seashore is indeterminate at this time and would depend upon where closures occur with regard to beach widths and the amount of wrack placed higher up on the beach than the mean high tide line by storms. The amount of wrack disturbed, though, would be less than under alternative A due to the additional areas closed seasonally and year round to ORV use.

Cumulative Impacts

Cumulative impacts under alternative B would be the same as under alternative A. The overall cumulative impact of these past, current and future actions, along with the actions under this alternative, would be short- to long-term minor adverse depending upon the individual species of invertebrate.

Conclusion

ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative B, but it would be less than alternative A. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would be negligible throughout the seashore. Closing key piping plover migratory/wintering habitat would provide long-term moderate benefits by protecting all invertebrate species in these areas and allowing them to recover to natural levels. Closing Middle Core Banks and “Ophelia Banks” and the northern 2 miles of South Core Banks to ORVs would provide short-term minor to moderate benefits. Ghost crabs inhabiting the beach between Ramp 41B and Ramp 44 would be completely protected by prohibiting night driving, and encouraging drivers to use the backroads at night would result in impacts that were long-term minor to

moderate beneficial (depending upon the current level of impact). The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Under alternative C the management measures for the protected species would enhance the protection of invertebrates more than alternative A. Impacts on the intertidal zone would continue to be negligible throughout the seashore. Year-round closures would continue to allow invertebrate populations to maintain their naturally occurring levels in those areas, and seasonal closures (i.e., turtle nest relocation areas) would continue to provide short-term minor to moderate beneficial effects. Similar to alternative B, key piping plover migratory/wintering habitat would be closed to ORV traffic, providing long-term moderate beneficial effects on all invertebrate species inhabiting these areas. Closing Middle Core Banks and “Ophelia Banks” and the northern 2 miles of South Core Banks to ORVs from April 1 to August 31 would provide short-term minor to moderate beneficial effects; however, once the areas were reopened, the impacts would become adverse as the wrack line would not longer be protected. Ramp to ramp ORV closures for American oystercatcher would provide short-term minor to moderate benefits for invertebrate species inhabiting the wrack within these areas.

Under alternative C, there would be no restrictions on night driving throughout the seashore, and any impacts on ghost crabs would be similar to alternative A. Outside of closed areas, some of the wrack line may still be impacted by ORV use as beach widths and the increased size of protected species closures may force ORVs to drive lower in the intertidal zone than would normally occur. The total amount of beach within the seashore where the wrack line could potentially be disturbed would be the same as in alternative B, as the amount of areas permanently or seasonally closed to ORV traffic would be the same. However, the extent to which disturbance would occur within the entire seashore is indeterminate at this time and would depend upon where resource closures occur with regard to beach widths and the amount of wrack placed higher up on the beach than the mean high tide line by storms.

Cumulative Impacts

Cumulative impacts under alternative C would be the same as under alternative A. The overall cumulative impact of these past, current and future actions, along with the actions under this alternative, would be short- to long-term minor adverse depending upon the individual species of invertebrate.

Conclusion

Under alternative C the management measures for the protected species would enhance the protection of invertebrates more than alternative A, but slightly less than alternative B. Continuing to prohibit ORV traffic year round from Shackleford Banks, Portsmouth Flats, Power Squadron Spit, the interior of Cape Lookout Point, and the beach between mile markers 41A and 41B would allow the invertebrate populations in these areas to remain at their natural levels of abundance. Impacts within the intertidal zone would continue to be negligible throughout the seashore. Closing key piping plover migratory/wintering habitat as well as the northern 2 miles of South Core Banks to ORV traffic year round would provide long-term moderate benefits. Closing Middle Core Banks and “Ophelia Banks” would provide short-term minor to moderate benefits. By not restricting night driving, impacts on ghost crabs would be similar to alternative A, though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas would still be impacted by ORVs, though the total amount of impact

throughout the seashore would be less than alternative A due to increasing the number of areas closed to ORV traffic both seasonally and year round. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Under alternative D the management measures for the protected species would enhance the protection of the invertebrates more than alternative A, but less than alternatives B and C. Impacts on the intertidal zone would continue to be negligible throughout the seashore. Year-round closures would continue to allow invertebrate populations to maintain their naturally occurring levels in those areas, and seasonal closures (i.e., turtle nest relocation areas) would continue to provide short-term minor to moderate beneficial effects. Closing the northern 2 miles of South Core Banks while bird chicks are present and closing Middle Core Banks and “Ophelia Banks” to all ORVs from April 1 to August 31 would provide short-term minor to moderate beneficial effects; however, once these areas were reopened, the impacts would become adverse as the wrack line would no longer be protected. Increasing the number of ramp to ramp closures to all recreation use for the American oystercatcher would provide short-term minor to moderate benefits for invertebrate species inhabiting the wrack within these areas. Under alternative D, there would be no restrictions on night driving throughout the seashore, and any impacts on ghost crabs would be similar to alternative A. Outside of closed areas, some of the wrack line may still be impacted by ORV use as beach widths and the size of protected species closures may force ORVs to drive lower in the intertidal zone than would normally occur. The amount of beach area within the seashore where the wrack line could potentially be disturbed would be less than alternative A, but more than alternatives B and C due to the number of year round and seasonal ORV closures. However, the extent to which disturbance would occur within the entire seashore is indeterminate at this time and would depend upon where resource closures occur with regard to beach widths and the amount of wrack placed higher up on the beach than the mean high tide line by storms.

Cumulative Impacts

Cumulative impacts under alternative D would be the same as under alternative A. The overall cumulative impact of these past, current and future actions, along with the actions under this alternative, would be short- to long-term minor adverse depending upon the individual species of invertebrate.

Conclusion

ORV use would have direct adverse impacts on invertebrate species within the seashore under alternative D and would be less than alternative A, but more than alternatives B and C. Impacts within the intertidal zone would continue to be negligible throughout the seashore. Seasonally closing Middle Core Banks, “Ophelia Banks,” and the northern 2 miles of South Core Banks would provide short-term minor to moderate benefits. By not restricting night driving, impacts on ghost crabs would be similar to alternative A, though the extent of the impacts is indeterminate at this time. The wrack outside of closed areas would still be impacted by ORVs. The total amount of impact throughout the seashore would be less than alternative A, but more than alternatives B and C due to the number of year-round and seasonal ORV closures. Past, current, and future activities inside the seashore when combined with the impacts of recreation use would result in short to long-term minor impacts on invertebrates in the seashore. Invertebrate populations at the seashore would not be impaired under alternative D.

OTHER BIRD SPECIES

SPECIES-SPECIFIC METHODOLOGY AND ASSUMPTIONS

Potential impacts on other bird species populations and habitat were evaluated based on available data, on the species' past and present occurrence at Cape Lookout National Seashore, as well as the species association with humans, pets, predators, and ORVs. Information on habitat and other existing data were acquired from staff at Cape Lookout National Seashore, the U.S. Fish and Wildlife Service, and available literature.

The analysis focuses on effects to wildlife from a variety of human recreational activities, as well as impacts incurred as a result of surveying and management activities.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Although the management actions described under alternative A do not address bird species outside of those identified in the preceding sections, other bird species would benefit from these measures. Alternative A would include establishing full-recreational closures for piping plover and colonial waterbird active breeding areas, as well as ORV closures for other specified species and behavior. These closures and management actions would benefit other bird species that would use these protected areas, free of disturbance, thus providing a long-term minor beneficial impact.

Recreation activities that occur in the months when other bird species are in residence on beaches in Cape Lookout National Seashore have the potential to impact resting and foraging of other bird species. For example, it is possible that ORV activity and/or other recreation (including pedestrians and pets) that takes place within or near other bird species resting and feeding sites could cause other bird species to flush more often than they would without these activities, resulting in these species sacrificing time spent feeding and resting for time spent fleeing. These impacts would be long-term, minor, and adverse.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on other bird species resting or foraging at the seashore. Overall, the predator removal study could have beneficial effects on other bird species. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would have a long-term, minor, beneficial impact.

Cumulative Impacts

Cumulative impacts for other bird species would be the same as those described under American oystercatcher and colonial waterbirds. Cumulative impacts from these other actions would be long-term, minor and adverse. Cumulative impacts, when considered with those impacts outlined under alternative A, would be long-term, minor, and adverse.

Conclusion

The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor and adverse. Impairment to other bird species would not occur under alternative A.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING**Analysis**

Although the management actions described under alternative B do not address bird species outside of those identified in the preceding sections, other bird species would benefit from these measures. Alternative B would include establishing full-recreational closures for piping plover and colonial waterbird active breeding areas, as well as ORV closures for other specified species and behavior. In addition, a seasonal full-recreational closure would be established at the north end of South Core Banks. These closures and management actions would benefit other bird species that would use these protected areas, free of disturbance, thus providing a long-term minor beneficial impact. Recreation activities that occur in the months when other bird species are in residence on beaches in Cape Lookout National Seashore have the potential to impact resting and foraging shorebird species. For example, it is possible that ORV activity and/or other recreation (including pedestrians and pets) that takes place within or near to other bird species resting and feeding sites could cause other bird species to flush more often than they would without these activities, resulting in other bird species sacrificing time spent feeding and resting for time spent fleeing. These impacts would be long-term, minor, and adverse.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on other bird species resting or foraging at the seashore. Overall, the predator removal study could have beneficial effects on other bird species. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would have a long-term, minor, beneficial impact.

Cumulative Impacts

Cumulative impacts under B would be the same as alternative A. Cumulative impacts from these other actions would be long-term, minor and adverse. Cumulative impacts, when considered with those impacts outlined under alternative B, would be long-term, minor, and adverse.

Conclusion

The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative B.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Although the management actions described under alternative C do not address bird species outside of those identified in the preceding sections, other bird species would benefit from these measures. Alternative C would include establishing full-recreational closures for piping plover and colonial waterbird active breeding areas, as well as ORV closures for other specified species and behavior. In addition, a seasonal ORV closure would be established at the north end of South Core Banks and at “Ophelia Banks” and Middle Core Banks. These closures and management actions would benefit other bird species that would use these protected areas, free of disturbance, thus providing a long-term minor beneficial impact. As with alternatives A and B, recreation activities that occur when other bird species are in residence on beaches in Cape Lookout National Seashore have the potential to have minor adverse impact to resting and foraging shorebird species. Under alternative C, there would be no year-round

closures of key piping plover wintering habitat. Therefore, impacts would be long-term, minor, and adverse.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on other bird species resting or foraging at the seashore. Overall, the predator removal study could have beneficial effects on other bird species. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would have a long-term, minor, beneficial impact.

Cumulative Impacts

Cumulative impacts under C would be the same as alternative A. Cumulative impacts from these other actions would be long-term, minor, and adverse. Cumulative impacts, when considered with those impacts outlined under alternative C, would be long-term, minor, and adverse.

Conclusion

The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative C.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

Although the management actions described under alternative D do not address bird species outside of those identified in the preceding sections, other bird species would benefit from these measures. Alternative D would include establishing full-recreational closures for piping plover and colonial waterbird active breeding areas, as well as ORV closures for other specified species and behavior. In addition, like alternative C, a seasonal ORV closure would be established at the north end of South Core Banks and at “Ophelia Banks” and Middle Core Banks. These closures and management actions would benefit other bird species that would use these protected areas, free of disturbance, thus providing a long-term minor beneficial impact.

As with the other alternatives, recreation activities that occur in the months when other bird species are in residence on beaches in Cape Lookout National Seashore have the potential to impact resting and foraging shorebird species. Under alternative D, there would be no year-round closures to key piping plover wintering habitat. Therefore, impacts would be similar to alternative A, long-term, minor, and adverse.

Other seashore management includes research efforts ongoing within the seashore. Two such efforts include an evaluation of the consequences of predator removal for endangered species management and a visitor and ORV use study to measure the impact of ORVs on beach birds. Depending on the intensity, location, and timing of these research activities, there may or may not be an effect on other bird species resting or foraging at the seashore. Overall, the predator removal study could have beneficial effects on other bird species. The visitor use study could benefit the species once more detailed information regarding use patterns is available to resource managers. Therefore, potential adverse impacts associated with research efforts would be outweighed by the overall beneficial impacts that may result from the information gathered and thus would have a long-term, minor, beneficial impact.

Cumulative Impacts

Cumulative impacts under alternative D would be the same as under alternative A. Cumulative impacts from these other actions would be long-term, minor and adverse. Adding in the minor adverse impacts on other bird species from recreational use at the seashore under alternative D, cumulative impacts under alternative D would be long-term, minor, and adverse.

Conclusion

The other bird species are winter, fall, spring, and summer residents at the seashore and impacts from recreational use would be long-term, minor, and adverse. Protected species management and related research would provide an overall long-term, minor, beneficial impact. Cumulative impacts would also be long-term, minor, and adverse. Impairment to other bird species would not occur under alternative D.

VISITOR USE AND EXPERIENCE

GUIDING REGULATIONS AND POLICIES

The NPS *Management Policies 2001* (NPS 2000a) state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks.

Cape Lookout National Seashore's purpose states that it would be administered to conserve and preserve for public use and enjoyment the outstanding natural, cultural and recreational values of a dynamic coastal barrier island environment for future generations. The national seashore serves as both a refuge for wildlife and a pleasuring ground for the public, including the developed visitor amenities. The mission goals in the *2000 Strategic Plan* (NPS 2000b) that fall under the general category of "Provide for Public Enjoyment and Visitor Experience" include the following:

- Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of Cape Lookout National Seashore's facilities, services, and appropriate recreational opportunities. Visitors must be able to enjoy and experience Cape Lookout National Seashore safely. Accessibility for special populations must be provided, where appropriate. Diversity and quality of the national seashore's facilities, services, and recreational opportunities must be considered for all visitors without being harmful to seashore resources or inconsistent with the national seashore's purpose and philosophy.
- Seashore visitors and the general public understand and appreciate the preservation of Cape Lookout National Seashore and its resources for this and future generations. The national seashore's visitor's experience is enhanced from a better understanding of the purpose of what makes the seashore special. In addition, seashore neighbors in surrounding communities understand and appreciate the preservation of the national seashore's resources for this and future generations.

While recreation is a key component of the NPS *Management Policies 2001*, they also instruct park units to maintain all native plants and animals as parts of the natural ecosystem. The NPS would achieve this by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant-and-animal populations and the communities and ecosystems in which they occur (NPS 2000a, sec. 4.4.1).

The goals of providing recreational opportunities and protecting the natural systems at Cape Lookout National Seashore are evident in the objectives of this plan/EA, as stated in the "Purpose of and Need for Action" chapter.

METHODOLOGY AND ASSUMPTIONS

The potential for change in visitor experience was evaluated by identifying projected increases or decreases in visitor uses related to the proposed alternatives, and determining whether these projected changes would affect the desired visitor experiences. The primary sources of data used to determine these changes were seashore-wide and site-specific visitor use counts and daily ORV arrivals and departures, as well as cumulative vehicle days, at Great Island and Long Point ferry landings on South Core Banks and North Core Banks, respectively.

As explained in the "Affected Environment," ORVs that arrive at each ferry landing are recorded daily beginning when the ferry runs in March and continuing through December of each year. Ferry service is not available in January or February. Off-road vehicles that arrive or depart at each ferry landing daily are added and subtracted, respectively, to the vehicles that are currently in use or in long-term parking. The daily total results in ORV vehicle days and provides an indication of the number of ORVs that are on

each island on any given day. However, the NPS does not have studies that identify how many of these ORVs are actually operating on seashore beaches or on the backroads on any given day or specifically where ORV users are traveling or recreating on the island (other than from general observation). Monthly visitor use data is available from the NPS statistics website that indicates the number of visitors at site-specific locations and island-wide (North Core and South Core/Shackleford Banks) for day-use, overnight, or beach activities. However, this data does not indicate whether the recreational activity is ORV dependent.

For purposes of this visitor use analysis, it was assumed that the average daily vehicle days at each ferry landing (monthly total vehicle days/days in the month) would represent the potential number of ORVs on seashore beaches. This is a worst-case scenario, because not all ORVs would be on the island roads or beaches at any given time (some would be parked in long-term parking until their owner returns); however, without data indicating the average number of vehicles parked each day, this assumption is reasonable.

The visitor-use analysis focuses on the possibility and potential locations of closures around buffers for sensitive species and their habitats and their potential impact on seashore recreation uses. Probable future locations for closure areas were determined by evaluating historic breeding, roosting, and foraging habitat for the federally and state-listed species discussed in subsequent sections, such as the piping plover, sea turtles, American oystercatcher, and seabeach amaranth, among others.

As described in the “Alternatives” chapter, the closures are one of two types:

- **ORV Closures**—ORV use is prohibited, but other recreational users such as pedestrians and pets are allowed in these areas
- **Full Recreational Closures**—all recreational users are prohibited in these areas, including pedestrians and ORVs

Generally, closures that are established to protect sensitive bird species are full recreational closures, since pedestrian use and other non-vehicular users can disrupt nesting and other life stages. Closures that are established to protect areas with nesting sea turtles are generally ORV closures (with a small area immediately around the nest closed to all recreational use), since pedestrian use in these areas can occur without adverse impacts.

As indicated in “Visitor Use and Experience” in the “Affected Environment” chapter, ORV use occurs throughout the length of South Core Banks and North Core Banks. ORVs are prohibited on Shackleford Banks. In addition, dispersed recreation uses such as camping, swimming, sunbathing, beach walking, and shell collecting are also engaged in areas where this ORV activity also occurs. Therefore, much of the visitor-use analysis focuses on how the species and recreation management strategies proposed in each alternative might affect ORV users on North Core Banks and South Core Banks, as well as Middle Core and “Ophelia Banks.” More developed recreation uses, such as visiting the lighthouse and Portsmouth Village, are not evaluated in this analysis because these opportunities would either not be affected, or would be affected marginally, by the alternatives.

The breeding habitats of each species, particularly the piping plover, American oystercatcher, and the sea turtles, are also important in determining visitor-use impacts. The likelihood of closures that would limit visitor accessibility to portions of the beach via ORV or on foot is dependent on when these species court, establish territory, build nests, and lay eggs, as well as when the young first leave the nest to forage for food or return to the sea (turtle hatchlings).

Based on the life stages of these species, breeding-territory establishment and courtship for the piping plover generally begins in late-March, the first nests are initiated in late-April, and the brood-rearing period extends from late-May to mid-August (Cohen 2005b). The time when plover chicks leave the nest and forage for food, and before fledging, generally occurs in July and August and lasts approximately 21

to 35 days (3 to 5 weeks). The first turtle nests begin to appear at Cape Lookout National Seashore in mid-May, and the last nests are deposited in late-August. Eggs incubate approximately 63 to 68 days before hatchlings emerge. At the seashore, hatchlings generally emerge anytime between July and early-November. During this period, ORV closures could occur between each nest and the ocean shore for approximately 4 to 6 weeks to allow for eggs to hatch and hatchlings to reach the water's edge unharmed.

As a result of these breeding patterns, full recreational closures around the nests of various bird species would be likely to begin in early-summer and extend throughout the summer months, whereas the generally larger ORV closures to protect foraging chicks and hatching sea turtles would begin in July and extend into the fall. ORV closures for these chicks and hatchlings would average approximately 4 weeks per closure. Thus, during the months of July and August, it is likely that both full recreational closures and extended ORV closures could occur throughout the seashore to protect bird species and sea turtles in various life stages potentially impeding or preventing ORV travel to a greater degree than during other months of the year.

STUDY AREA

The geographic study area for the visitor use and experience analysis is the entire Cape Lookout National Seashore, but primarily, the beaches, internal roads, and ORV access ramps within the seashore.

IMPACT THRESHOLDS

The following thresholds for evaluating impacts on visitor experience were defined:

<i>Negligible:</i>	Visitors would likely be unaware of impacts associated with proposed changes. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.
<i>Minor:</i>	Changes in visitor use and/or experience would be slight and detectable, but would not appreciably limit or enhance any critical characteristics of the visitor experience. Visitor satisfaction would remain stable.
<i>Moderate:</i>	A few critical characteristics of the existing visitor experience would change, and the number of visitors engaging in a specified activity would be altered. Some visitors participating in that activity or visitor experience might be required to pursue their choices in other available local or regional areas. Visitor satisfaction at the seashore would begin to either decline or increase.
<i>Major:</i>	A number of critical characteristics of the existing visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. Large numbers of visitors overall who desire to continue using and enjoying that activity or visitor experience would be required to pursue their choices in other available local or regional areas. Overall visitor satisfaction would markedly decline or increase.
<i>Duration:</i>	Short-term impacts would occur sporadically throughout a year, but would generally last no more than three weeks per year. Long-term impacts would occur more than three weeks per year, and could continue beyond the life of the interim protected species management plan/EA, depending on the outcome of the long-term ORV management plan/EIS.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

ORVs and Recreational Opportunities. Alternative A would generally provide continued ORV access throughout the seashore, except in the full recreational closures established around the active nesting areas of piping plovers and around the nest buffers established for plovers, American oystercatchers, and colonial waterbirds, as well as the permanent ORV closures at Portsmouth Flats, the interior of Cape Lookout Point, Power Squadron Spit, and the beach between mile markers 41A and 41B. Areas that would be closed April 1 each year would depend upon where the piping plovers are presently nesting or nested the previous season, but would most likely include Ocracoke Inlet, Kathryn-Jane Flats, Old Drum Inlet, New Drum Inlet, Plover Inlet (mile 23.6), and areas on Shackleford Banks. Full recreational closures would also be established around active and some historic colonial waterbird nesting areas throughout the seashore.

Because the full recreational closures around bird nest buffers would be limited in size, ORV access would be provided around most of these areas, except for on Shackleford Banks where no ORVs are allowed. Thus, anglers and other recreational users would continue to have access to the spits where favorable fishing spots occur, as well as to the many miles of beach along all the islands. Visitors arriving by private boat would also continue to have access to areas like Old Drum Inlet and the south end of Middle Core Banks on the soundside and cross over to the oceanside to participate in various activities.

Closures could expand around bird nesting areas when chicks leave the nest, prohibiting access for ORVs within 600 feet of piping plover broods or along a stretch of beach between two ORV ramps where American oystercatcher chicks are foraging. Chicks could become mobile anytime throughout the summer months, but most likely in July or August, using the beaches for 3 to 5 weeks until they take flight. Generally, ORVs would be able to drive around ORV closures for piping plovers. However, in areas where the beach is narrow and plovers choose to nest, a segment of beach from the dune to the shoreline could be closed, restricting ORV travel into and through these areas. When such a closure occurs, ORVs would be detoured to a backroad. If no road was available, the seashore would consider implementing an escort program through a piping plover foraging area on a very limited, case-by-case basis. Where American oystercatcher chicks require a ramp-to-ramp ORV closure, ORV access at reduced vehicle speeds could be implemented to allow access to important visitor use areas. A vehicle escort system was implemented in previous summer seasons at Kathryn Flats to allow continued ORV access to the northern half of North Core Banks and to Portsmouth Village.

If ORV and pedestrian access continues to be provided around or, if necessary, through full recreational and ORV closures to important visitor use areas on North Core Banks, Middle Core Banks, and South Core Banks short-term, minor, adverse impacts on ORV users would occur. Generally, these closures would not impact the spring or fall fishing seasons.

Similar to bird closures, ORVs would continue to have access around sea turtle nests when eggs are incubating. However, at approximately 50 days from the time a nest was laid, an ORV closure would be implemented from the turtle nest to below the ocean tide-line. Where possible, ORV access would be provided behind the nest if sufficient space exists between the nest and dune line or, alternately, ORVs would be routed to the backroad. These closures would generally last upwards of a month. The turtle nest relocation areas on South Core Banks and North Core Banks could also be closed to ORVs at 50 days after the first nest is relocated and would last into the fall. However, ORV access around these areas would be available via ramps and the backroad. Because ORV access would continue to be maintained, impacts related to sea turtle nests would also be short-term and minor adverse similar to those associated with the bird nests.

Because of the limited area associated with seabeach amaranth closures, impacts would be short-term and negligible adverse.

If full recreational or ORV closures occur to protect bird or sea turtle nests, foraging chicks, or sea turtle hatchlings at Cape Lookout Point, other inlets, or in multiple locations on North Core Banks and South Core Banks and ORV access could not be provided around the closure, impacts would be more adverse. Because inlets are an important area for visitors, particularly anglers, any restriction to these areas would adversely impact visitors. In addition, during summer months such as July and August, ORV closures would be more likely to occur and would be more likely to limit ORV access through multiple beach areas because not only are piping plover and American oystercatcher chicks foraging on the beach, but sea turtles are also beginning to hatch. The cumulative effect of protection measures for bird and sea turtle nests, foraging chicks, and sea turtle hatchlings that could restrict ORVs could also adversely impact visitors to a greater degree than the impacts associated with individual bird or sea turtle nests (as presented above).

Based on multiple-year ORV counts at Great Island ferry landing, approximately 150 ORVs are on South Core Banks daily throughout June, July, and August when an ORV closure might occur that could restrict ORV access to an inlet or through a number of locations along the island (this assumes ORV use levels similar to 2001 through 2003 because summer ORV counts were missing in 2004; thus, earlier data was used). Approximately 30 to 50 ORVs operate daily during the summer months on North Core Banks based on 2003 data at Long Point ferry landing (visitation in 2004 was substantially reduced to approximately 11 vehicles per day) (NPS 2004b). Approximately 4,500 and 1,500 ORV vehicle days occur on South Core Banks and North Core Banks, respectively, during a summer month when ORV closures might occur to protect foraging chicks or emerging turtle hatchlings and result in no ORV access through one or more beach areas. This is approximately 10% to 15% of all vehicle days that occur annually on South Core Banks, as well as on North Core Banks. However, the number of ORVs that occur on the beach versus parked in long-term parking on any given day is unknown, as is the number of vehicles that travel daily or monthly to destinations such as Cape Point or the inlets. Assuming a closure that would prevent ORV access through a beach area, less than 10% of annual ORV vehicle use days for either island would be impacted by an inaccessible closure resulting in short-term minor to moderate adverse impacts on ORV users (NPS 2004b).

ORV and other recreational users, such as boaters, displaced from one seashore beach to another due to ORV or full recreational closures could cause some additional crowding in areas outside of closures and potentially impact visitor experience. However, it is expected that the number of closures would not markedly change the existing visitor experience during the summer months resulting in short-term, minor, adverse impacts on seashore visitors. Some ORV closures for turtle protection would extend into the fall when fishing use is more predominant, potentially impacting some anglers; however, impacts would most likely remain short-term and minor. The potential for moderate adverse impacts does exist, depending upon the characteristics of anglers at Cape Lookout National Seashore and their desire for a more remote fishing experience. The upcoming visitor survey to be conducted by East Carolina University could answer some of these questions in the future.

Fishing tournaments are a special activity that occur during the spring and fall in ocean beach areas throughout the seashore. Some closures could occur during the spring and fall but as explained above, these would not be overly restrictive to ORV and other recreation uses, including surf fishing. Therefore, alternative A would result in short-term negligible to minor adverse impacts on visitors participating in fishing tournaments.

Pedestrian Uses and Other Recreational Opportunities. An ORV closure on the interior of Cape Lookout Point (adjacent to the permanently closed interior) as a result of foraging chicks would also affect other seashore visitors that arrive during the summer at the ferry landing for the Cape Lookout Lighthouse. Passenger ferries arrive near the lighthouse April through November, 7 days per week, throughout the day and depart from Harkers Island and Beaufort. Based on data from the seashore, approximately 32,951 visitors arrived via ferry to the lighthouse area in 2004. Visitors who desired to visit Cape Lookout Point via foot during the summer months when ORV closures could occur would

continue to have access resulting in short-term, negligible, adverse impacts. However, visitors who hoped to visit Cape Lookout Point via a concessionaire-operated shuttle might not be able to access the area via vehicle, assuming availability of such shuttles, resulting in short-term, minor, adverse impacts on these visitors.

Similarly, visitors who arrive at the lighthouse and on Shackleford Banks via ferry to participate in a variety of pedestrian-oriented activities such as beach walking could be adversely affected if multiple full recreational closures occurred around bird nests in the vicinity of their arrival location. Pedestrians are not as mobile as ORV users and, therefore, would be more likely to be affected by full recreational closure areas. However, the size of the closures would not be substantial and pedestrian would be able to negotiate around them; thus, impacts would remain short-term and minor in this alternative.

Pedestrians and other activities, such as swimming, sunbathing, beach walking, jogging, and shell collecting, would be allowed outside of the delineated, closed areas for bird and turtle nest protection. Camping and beachfires would not be allowed within turtle relocation areas. Pets would be allowed on leash within the seashore; however, they would be restricted from all full recreational closure areas for bird protection. These restrictions would have short-term, negligible to minor, adverse impacts on visitor use, because pedestrian access would be generally available around the full recreational closure area and, in most cases, would not prevent pedestrian access along the beach.

Outreach and Compliance. Outreach efforts related to endangered species management and limited compliance surveying 2 to 3 days per week by the seashore at North Core Banks and South Core Banks, Shackleford Banks, Middle Core Banks, and Harkers Island would result in long-term, minor, beneficial effects on visitor use and experience. The information available at the visitor center and some staff presence enforcing closures would help minimize any noncompliance due to lack of information and would begin to help ensure that visitors are aware of closure areas.

Cumulative Impacts

Other past, current, and planned future activities within Cape Lookout National Seashore have the potential to affect visitors and the recreational opportunities supported within the seashore. In recent years, hurricanes, storms, and other events, and the subsequent recovery time required following these events, have adversely impacted visitors. Barrier islands are dynamic and constantly being reshaped by the forces of nature, such as weather events. Following these events, roads are often overwashed with sand and water, facilities are destroyed, and portions of an island may be lost or reshaped. Visitors cannot consistently depend that the recreation opportunity or visitor experience they enjoyed during a recent or past visit may be available in the future. In addition, following an event, staff and other seashore resources may be dedicated to recovery efforts rather than to facilitating visitor enjoyment in some areas throughout the seashore and passenger ferries to North Core Banks and South Core Banks and Shackleford Banks may not be running. Depending on the degree of damage following a storm, areas of the seashore may be closed and ferries may not run for a substantial period of time. Thus, weather events may result in short-term and long-term minor to major adverse impacts on visitor use and experience, depending upon the severity of the storm.

Adverse impacts may also result from other activities within the seashore, including the dredging of Beaufort Inlet, which may cause some temporary adverse impacts on visitor experience on Shackleford Banks during dredging activities. The development of the Cape Hatteras National Seashore Interim Protected Species Management Strategy/EA, which may impact the availability of seashore areas to ORVs and other recreation opportunities in the interest of protecting important seashore species, could further impact the availability of ORV opportunities along the North Carolina coast, resulting in long-term, moderate, adverse impacts on ORV recreation opportunities during the time the strategy is being implemented. Similarly, the development of the long-term ORV management plan/EISs for both Cape Hatteras National Seashore and Cape Lookout National Seashore could result in temporary seasonal or annual permanent management changes that may adversely affect ORV and other recreational uses in the

long-term. However, long-term benefits may also be provided by improving visitor experience for ORV users through more consistent application and a greater awareness of resource closures and for non-ORV users, such as beach users and bird watchers seeking a more vehicle-free environment.

Other beneficial effects on visitor experience have occurred, and would continue to occur into the future, from the implementation of the following seashore plans or actions: *Cape Lookout Horse Management Plan*; Concession operations, including ferry operations, that are being evaluated in the *Commercial Services Plan*; *Cape Lookout National Seashore General Management Plan* (NPS 2001b); *Cape Lookout Historic District Management Plan* and *Cultural Landscape Plans*; Historic Structures Stabilization project; *Cape Lookout National Seashore Comprehensive Interpretive Plan*; and the *Exhibit Plans* at Harkers Island, the Cape Lookout Keepers' Quarters, and at waysides throughout the seashore would enhance visitor understanding of important resources throughout the seashore.

The ongoing operation of ferry services and overnight facilities to and on the island and the historic structure stabilization project to protect the lighthouse would result in major beneficial effect on visitor use and experience because visitors rely on these services to visit North Core, South Core, and Shackleford Banks and because Cape Lookout Lighthouse is an important, highly visited, seashore feature. Without ferry services, most visitors would not be able to access the vast majority of the seashore. The horse management plan, general management plan, historic district and cultural landscape plans, interpretive plan, and wayside plans would most likely provide long-term, minor to moderate, beneficial effects because these plans and activities would ensure that visitor opportunities continue within the seashore.

The adverse impacts of storm events and long-term ORV management plan/EISs and the beneficial effects related to seashore plans, in combination with the generally minor adverse impacts of alternative A, would result in long-term, minor, adverse cumulative impacts on ORV users and other seashore visitors depending upon weather events during any given year. The adverse impacts associated with alternative A would comprise a small portion of these cumulative impacts in comparison to events like hurricanes.

Conclusion

Alternative A would provide continued ORV access throughout the seashore, except within full recreational or ORV closure areas implemented for bird or turtle protection.

When chicks or hatchlings become mobile, continued ORV access around expanded closures via a backroad or through closures via a limited escort program would result in short-term, minor, adverse impacts on ORV users.

If closures that prevented ORV access through an area occurred at Cape Point, other inlets, or at multiple locations on South Core Banks and North Core Banks displacing ORV use for approximately one summer month, substantially less than 10% of annual ORV vehicle use days would be affected resulting in short-term minor to moderate adverse impacts on ORV users.

ORV closures could result in some additional crowding and full recreational closures would restrict some pedestrian access resulting in short-term, minor, adverse impacts.

Outreach efforts related to endangered species management and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.

LONG-TERM, MINOR, ADVERSE CUMULATIVE IMPACTS WOULD OCCUR. IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

ORV and Recreational Opportunities. In addition to the permanent and seasonal bird nesting closures described in alternative A, the closure of the northern 2 miles of South Core Banks to all recreation,

including ORVs and boats, for approximately 1 to 2 summer months when chicks are foraging and the closure of Middle Core Banks and “Ophelia Banks” to all ORV use for 5 months beginning in April would result in fewer options for fishing or recreating near inlets for summer ORV users in comparison to alternative A. In addition, the potential for ramp-to-ramp beach closures to protect foraging American oystercatcher chicks could further restrict ORV access to the beach because these birds nest throughout the seashore. ORV access would be available by the backroad, but not necessarily on a beach unless an escort system was implemented through a bird closure area. However, this option would only be implemented on a case-by-case basis to provide access to important visitor use areas.

In 2005, the American oystercatcher nests counted by the seashore staff were divided as follows: approximately 20 nests on North Core Banks between 13 different mile markers beginning at mile 0.2 and ending at mile 15.5; approximately 26 nests on South Core Banks between 17 different mile markers beginning at mile 23 and ending at mile 47; and 9 nests on Middle Core Banks. The nests on Middle Core Banks would be included within the seasonal closure proposed in Alternative B, as would several of the nests on the northern end of South Core Banks. Approximately 11 (55%) and 8 (30%) of these nests on North Core Banks and South Core Banks, respectively, actually produced chicks and even fewer fledged chicks. The majority of the nests, but not all, were located within different mile markers – some at base of the primary dune, on the flats between dunes, or near the backroad. Thus, in 2005, had all the chicks foraged on the beach, approximately 8 miles of ramp-to-ramp closures could have occurred on both North Core Banks and South Core Banks for 3- to 5-week periods throughout June and July.

In addition, boats would no longer be able to anchor on the soundside of areas like the south end of Middle Core Banks and use ATVs to cross over to the oceanside to participate in recreational activities such as fishing.

These limitations on ORV use due to seasonal and permanent ORV closures and decreased opportunities for visitors who use these popular fishing areas (New and Old Drum Inlet) would result in long-term, moderate, adverse impacts on ORV users and summer anglers. If Cape Lookout Point was temporarily closed to ORV due to foraging American oystercatcher chicks or sea turtle hatchlings, this impact on summer anglers would become short-term, major, and adverse, because all the inlet and point areas at Cape Lookout National Seashore would be closed. Generally, these expanded closures would not impact the spring or fall fishing seasons, except for in April at Middle Core and “Ophelia Banks.”

Turtle and seabeach amaranth closures would be established as described in alternative A, but they would be larger in size. A 30 square-foot full recreational closure would be delineated around sea turtle nests and historic seabeach amaranth habitat. Although ORVs would be provided access around these closures when space is available or would be routed to the backroad, the expanded closures could make beach driving more inconvenient throughout the seashore. Because more turtle nests would be relocated, these relocation areas on South Core Banks and North Core Banks could be closed longer than in alternative A, depending upon when the first and last nests are relocated. However, ORV access around these areas would be available via ramps and the backroad. Because ORV access would continue to be maintained, ORV impacts related to sea turtle nests and seabeach amaranth would be short-term and minor adverse. Night driving restrictions due to sea turtles in the vicinity of Cape Lookout Point would also cause some short-term, minor, adverse impacts on ORV users because these closure areas would minimize night-time access.

Similar to alternative A, displaced ORV and other recreational users, such as boaters, could cause additional crowding at other inlets such as Ocracoke and in the remaining open beach areas. Crowding could be more of a factor in this alternative than in alternative A because of the increased number of closures. However, because the average number of daily ORVs is approximately 150 on South Core Banks and 30 to 50 on North Core Banks (NPS 2004b), and a percentage of these ORVs are parked and not using the seashore beaches, sufficient beach areas most likely exist throughout the 56 miles of

seashore beach to accommodate displaced recreation users without adversely affecting other visitors. Thus, only long-term, minor, adverse impacts would occur to ORV users and other seashore visitors.

Spring fishing tournaments could be impacted by the April closure of Middle Core Banks and “Ophelia Banks”; however, the closure of the northern end of South Core Banks would occur during the summer months and would not impact fishing tournaments. Therefore, alternative B would result in short-term, minor, adverse impacts on visitors participating in fishing tournaments.

Camping and beachfire prohibitions within areas of high American oystercatcher concentrations and within 600 feet of sea turtle closures could affect backcountry campers, including ORV campers, throughout the seashore, but particularly on South Core Banks where high numbers of turtle and American oystercatcher nests occur. As described in the “Sea Turtle” section of the “Affected Environment” chapter, the number of sea turtle nests at Cape Lookout National Seashore has averaged 131 since 1990. The nests are generally distributed as follows: 53% on South Core Banks, with the greatest concentration occurring south of the lighthouse between mile markers 42 and 44; 34% on North Core Banks, and 13% on Shackleford Banks. As illustrated in figure 17, a 600-foot buffer around each turtle nest could eliminate a large percentage of beach area available for camping because of the size of the buffer relative to the beach width. In addition, the potential for ramp-to-ramp camping closures for high concentrations of American oystercatcher nests (3 or more between a ramp) could also decrease the amount of beach available for camping. In 2005, 3 or more oystercatcher nests occurred between mile markers 39 and 40, between mile markers 40 and 41, as well as between mile markers 9 and 10 on North Core Banks. Thus, under alternative B, these areas would have been closed to camping in addition to the area surrounding sea turtle nests. These combined camping closures could eliminate a substantial portion of North Core Banks and South Core Banks to camping use affecting approximately 13,200 backcountry camping overnight visits (2004 figures). Therefore, the impacts associated with this would be long-term and major adverse to campers, particularly in June and October. Backcountry camping use is highest during these months and the displacement to remaining open beach areas, particularly in June when both turtle and oystercatcher camping closures would occur, would result in increased crowding and markedly decreased visitor satisfaction due to increased encounters with other campers in open and available areas.

Pedestrian Uses and Other Recreational Opportunities. As described in alternative A, a temporary ORV closure on Cape Lookout Point related to foraging chicks would also affect other seashore visitors that arrive at the ferry landing for the Cape Lookout Lighthouse during the summer. When species closures occur, visitors would continue to have access via foot; however, visitors would not be able to access the area via shuttle vehicles resulting in short-term, minor, adverse impacts on these visitors depending upon the locations they wanted to visit and the experiences they hoped to experience while on South Core Banks and at the lighthouse. In addition, visitors who arrive at the lighthouse and on Shackleford Banks via ferry to participate in a variety of pedestrian-oriented activities such as beach walking could be adversely affected in the short-term and to a minor degree if multiple full recreational closures occurred around bird nests in the vicinity of their arrival location. Pedestrians are not as mobile as ORV users and, therefore, would be more likely to be affected by full recreational closure areas.

Pedestrians and visitors pursuing other activities, such as swimming, sunbathing, beach walking, jogging, and shell collecting, would not be allowed within the full recreational closures that surround bird nests, but would be allowed within the larger ORV closures that often encompass these areas. Kite-flying would not be allowed. The prohibition of pets within the seashore for four months in the spring and summer would result in long-term, moderate, adverse impacts on those visitors who regularly bring their pets to the seashore. Because of this restriction, a critical part of some visitor’s experience would change because they would have to leave their pets at home or opt to travel to other seashore areas if pets are an important part of their experience. Because most parks allow leashed pets, visitors may not consider bringing their pet to the seashore as a benefit; however, it may be considered a moderate adverse impact when the privilege of bringing a pet is revoked.



FIGURE 17: CAMPING RESTRICTIONS AROUND SEA TURTLE NESTS

Outreach and Compliance. Outreach efforts at the visitor centers, through signs, bulletins, interpretive programs, and the seashore website, and through information and education efforts 50% of the time at the Great Island and Long Point ferry landings would serve to better educate the visitor about endangered species management resulting in long-term, minor, beneficial effects on seashore visitors. Compliance surveying 2 to 3 days per week by the seashore at the same locations as alternative A, plus limited night enforcement, would result in long-term, minor, beneficial effects on visitor use and experience. The information available at the visitor center and ferry landings, and the staff presence enforcing closures would help minimize noncompliance due to lack of information and would begin to help ensure that visitors are aware of closure areas.

Cumulative Impacts

Impacts related to past, current, and future actions at Cape Lookout National Seashore that could affect visitor use and experience would be the same as described in alternative A. A range of long-term minor to major adverse impacts could occur related to weather events, such as hurricanes, and long-term ORV management plan/EISs. The ongoing operation of ferry services and overnight facilities and the historic structure stabilization project to protect the lighthouse would result in long-term major beneficial effects on visitor use and experience. The horse management plan, general management plan, historic district and cultural landscape plans, interpretive plan, and wayside plans would most likely provide long-term, minor to moderate, beneficial effects because these plans and activities would ensure that visitor opportunities continue within the seashore.

The adverse impacts of storm events and long-term ORV management plan/EISs and the beneficial effects related to seashore plans, in combination with the minor to major adverse impacts of alternative B,

would result in long-term, moderate, adverse cumulative impacts on ORV users and other seashore visitors. The adverse impacts associated with alternative B would most likely comprise a small portion of these cumulative impacts in comparison to weather events such as hurricanes.

Conclusion

The closure of the northern 2 miles of South Core Banks and the closure of Middle Core Banks and “Ophelia Banks” would result in limited options for fishing or ORV use near inlets in comparison to alternative A.

Potential ramp-to-ramp ORV closures to protect foraging American oystercatcher chicks would result in further restrictions on ORV use because oystercatchers nest throughout the seashore. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users, summer fishermen, and other recreational uses.

However, if Cape Point was closed due to foraging chicks or hatching sea turtles, short-term, major adverse impacts could occur to anglers because many popular fishing areas would potentially be closed to ORV use. Because ORV access would continue to be maintained, impacts related to ORV closures around sea turtle nests and seabeach amaranth would be short-term and minor adverse.

Camping prohibitions within 600 feet of sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry campers, particularly in June and October, due to the number of nests that occur along South Core Banks and North Core Banks.

Full recreational closures would result in short-term, minor, adverse impacts on pedestrians because they would continue to have access around most recreational closures.

However, prohibition of pets within the seashore would result in long-term, moderate, adverse impacts on those visitors who regularly bring their pets to the seashore during the summer.

Outreach efforts and limited compliance surveying would result in long-term, minor, beneficial effects on visitor use and experience.

Long-term, moderate, adverse cumulative impacts would occur.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

ORV and Recreational Opportunities. As described in alternative B, Portsmouth Flats, the interior of Cape Lookout Point, the beach between mile markers 41A and 41B, and Power Squadron Spit are permanently closed and the northern 2 miles of South Core Banks, Middle Core Banks, and “Ophelia Banks” would be seasonally closed resulting in impacts on ORV users and boaters. Full recreational closures to protect bird and turtle nests would be the same as alternative A, except additional closures would be established for American oystercatchers displaying mating behavior and colonial waterbirds. Unlike alternatives A or B, additional ramp-to-ramp ORV closures would be implemented when three or more American oystercatcher pairs exhibited mating behavior or nested between ORV ramps or when insufficient space is available to accommodate 300-foot buffers around colonial waterbird nests. In the event that the backroad was not available during a ramp-to-ramp closure, ORVs would be allowed through ORV closures or a vehicle escort system would be considered on a limited, case-by-case basis. These additional ramp-to-ramp closures in combination with permanent and seasonal full recreational and ORV closures would result in long-term, moderate, adverse impacts on ORV users and anglers due to reduced beach access. If Cape Lookout Point was temporarily closed to ORVs due to foraging American oystercatcher chicks or sea turtle hatchlings, this impact on summer anglers would become short-term,

major, and adverse, because all the inlet and point areas at Cape Lookout National Seashore would be closed.

Impacts related to sea turtle and seabeach amaranth buffers, as well as displaced ORV users, would be short-term minor and adverse as described in alternative A. Similar to alternative B, spring fishing tournaments could be impacted by the April closure of Middle Core Banks and “Ophelia Banks”; however, the closure of the northern end of South Core Banks would occur during the summer months and would not impact fishing tournaments. Therefore, alternative B would result in short-term, minor, adverse impacts on visitors participating in fishing tournaments.

As described in alternative B, impacts related to camping and beachfire prohibitions within areas of high American oystercatcher concentrations and within 600 feet of sea turtle closures would affect backcountry campers, including ORV campers, throughout the seashore resulting in long-term, major adverse impacts on these users, particularly during high use seasons. In addition, tent camping would be prohibited within seabeach amaranth closures further reinforcing the potential for major, adverse impacts.

Pedestrian Uses and Other Recreational Opportunities. Similar to alternatives A and B, the potential for a temporary ORV closure on Cape Point to protect foraging chicks would affect other seashore visitors that arrive at the ferry landing for the Cape Lookout Lighthouse during the summer. Visitors on foot during the summer months when species closures could occur would continue to have access. However, visitor access via concessionaire-operated shuttles, if available, would be restricted and result in short-term, minor, adverse impacts on these visitors.

Pedestrians and other activities, such as swimming, sunbathing, beach walking, jogging, and shell collecting, would not be allowed within the full recreational closures that surround bird nests, but would be allowed within the larger ORV closures that often encompass these areas. Similar to alternative B, kite-flying would not be allowed. These restrictions would have short-term, minor, adverse impacts on pedestrian visitor use, because pedestrians would continue to have access around most recreational closures.

Similar to alternative A, pets on leash would be allowed within the seashore, but would be excluded from full recreational closures around nests, resulting in long-term, minor, adverse impacts.

Outreach and Compliance. Outreach efforts at the visitor centers, through signs, bulletins, interpretive programs, and the seashore website, and new, more highly visible signs to demarcate buffer and closure areas would be beneficial to the visitor. These efforts in combination with seashore personnel stationed at the Great Island and Long Point ferry landings equivalent to 100% of the time to better educate the visitor about endangered species management and current closures, as well as increased enforcement activities, could result in long-term, moderate, beneficial effects on seashore visitors, depending upon how visitors react to increased information.

In comparison to alternatives A and B, enforcement of species-related closures and the pet leash law would occur more frequently during the day and approximately 4 nights per month at locations listed in alternative A, plus “Ophelia Banks,” to ensure that visitors comply. These compliance efforts would be viewed as long-term, minor to moderate, beneficial effects on some visitors, such as those who participate in non-ORV activities such as bird-watching or beach walking, because species they enjoy viewing would be better protected. In addition, some ORV users such as anglers would also view compliance as beneficial because it is essential to protecting fishing-related ORV access to the seashore (Ketel 2005).

Cumulative Impacts

Cumulative impacts would be the same as alternative B. The adverse impacts of storm events and long-term ORV management plan/EISs and the beneficial effects related to seashore plans, in combination with the generally minor to major adverse impacts of alternative C, would result in long-term, moderate, adverse cumulative impacts on ORV users and other seashore visitors. The adverse impacts associated

with alternative C would comprise a small portion of these cumulative impacts in comparison to events like hurricanes.

Conclusion

Similar to alternative B, permanent and seasonal species-related ORV closures would result in fewer options for fishing or ORV use near inlets.

Potential ramp-to-ramp full-beach closures to protect mating American oystercatchers and expanded colonial waterbird buffers could result in further restrictions on ORV and other recreational uses. These combined restrictions could result in long-term, moderate to major, adverse impacts on ORV users and summer fishermen similar to alternative B because of reduced seashore-wide beach access.

In the event that Cape Point was closed due to foraging chicks, impacts could be major adverse to summer anglers because many popular fishing areas would potentially be closed to ORV use.

ORV and pedestrian impacts from sea turtle and seabeach amaranth buffers would be short-term and minor adverse. Camping prohibitions near sea turtle nests and in areas of high concentrations of nesting American oystercatchers would result in long-term, major, adverse impacts on backcountry campers.

However, pets would be allowed within in the seashore, but not within full recreational closure areas, resulting in long-term, minor, adverse impacts on those visitors who travel with their pets.

Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in long-term, moderate, beneficial effects; increased enforcement of species management requirements could result in long-term minor to moderate beneficial impacts.

Long-term, moderate, adverse cumulative impacts would occur.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

ORV and related Recreational Opportunities. As described in the other alternatives, multiple areas would be permanently and seasonally closed to protect mating and nest shorebirds, including the active nesting areas for plovers; areas permanently closed to ORVs such as Portsmouth Flats, Power Squadron Spit, Middle Core Banks, “Ophelia Banks,” and the northern end of South Core Banks. Although ORV access would generally be provided around these areas via the backroad or possibly an escort system, these closures would serve to restrict some beach access for ORV use. In addition to these closures, Cape Lookout Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and the historical nesting areas of terns and skimmers would be closed on April 1 and expanded as necessary resulting in long-term, moderate, adverse impacts on ORV users and anglers because of reduced beach access similar to alternatives B and C. In addition, ramp-to-ramp ORV closures to protect mobile American oystercatcher chicks could occur, although ORV access would be provided via the backroad or through the closure area either at reduced speeds or by an escort system.

Protection of sea turtle nests and seabeach amaranth would be the same as alternatives A and C, respectively, resulting in short-term, minor adverse impacts on visitors. In addition, visitors displaced from closures areas would also cause short-term, minor, adverse impacts on other visitors as described in alternative A.

Because backcountry camping would be allowed in all areas, except within full recreational closure areas that protect nests, impacts on campers would be short-term, minor and adverse, similar to alternative A.

Pedestrian Uses and Other Recreational Opportunities. As described in alternative A, impacts on visitors arriving at Cape Lookout Lighthouse to visit Cape Lookout Point would be minor, adverse if the point was closed due to foraging chicks. Also, pedestrians and other activities, such as swimming,

sunbathing, beach walking, jogging, and shell collecting, would not be allowed with full recreational closures that protect nests, but would have full access within ORV closures. These restrictions would have short-term, minor, adverse impacts on visitor use, because access would continue.

Similar to alternative A, pets on leash would be allowed within the seashore, but would be excluded from active closure areas, resulting in long-term, minor, adverse impacts.

Outreach and Compliance. In comparison to alternative A and the other alternatives, closures in this alternative would be more adaptive to the life stages of bird species, and, therefore, could be less predictable to seashore visitors. The outreach efforts of interpretive rangers, 100% of the time, at the Great Island and Long Point ferry landings, would help to minimize the adverse effects of changing closures by keeping all visitors at these locations on South Core Banks and North Core Banks informed of current closures and emphasizing and explaining the need for endangered species management. However, because these interpretive efforts would not be accompanied by frequent compliance surveying to further educate and encourage compliance of visitors, the beneficial effects would most likely be long-term and minor. Visitor satisfaction would most likely remain stable because education efforts would prevent adverse changes to critical aspects of visitor experience.

Cumulative Impacts

Cumulative impacts would be the same as alternative B. The adverse impacts of storm events and long-term ORV management plan/EISs and the beneficial effects related to seashore plans, in combination with the generally minor to moderate adverse impacts of alternative C, would result in long-term, moderate, adverse cumulative impacts on ORV users and other seashore visitors. The adverse impacts associated with alternative D would comprise a small portion of these cumulative impacts in comparison to events like hurricanes.

Conclusion

Permanent and seasonal species-related closures would result in fewer options for fishing or ORV use near inlets.

Additional closures encompassing all of Cape Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and the historical nesting areas of terns and skimmers could further restrict ORV and other uses. These combined restrictions could result in long-term, moderate, adverse impacts on ORV users and other recreational users, similar to alternatives B and C, because of reduced seashore-wide beach access.

Similar to alternative A, ORV impacts from sea turtle and seabeach amaranth closures would be short-term and minor adverse. Camping would be prohibited in all turtle nesting areas, resulting in impacts similar to alternative A.

Outreach efforts, particularly stationing seashore personnel at ferry landings, would result in long-term, minor, beneficial effects because compliance surveying would be similar to alternative A (less frequent than under alternative C).

Long-term, moderate, adverse cumulative impacts would occur.

SOCIOECONOMIC RESOURCES

GUIDING REGULATIONS AND POLICIES

The National Environmental Policy Act requires that economic and social impacts be analyzed when they are interrelated with natural or physical impacts. Economic impacts would potentially result from actions considered under the alternatives; therefore, they are addressed in this document.

METHODOLOGY AND ASSUMPTIONS

Socioeconomic impacts analyses estimate the impact of alternative proposed actions on future levels of economic activity for a defined region of influence. The magnitude of the impacts for each proposed alternative is usually quantified using a regional economic model and then compared to a baseline forecast or the no-action alternative. Under alternative A, it would be assumed that future economic indicators (e.g., employment rates, income levels) would increase (or decrease) at the same rate as under a scenario in which none of the proposed actions were to be implemented. Depending on whether the proposed alternatives would lead to changes in population levels, the socioeconomic impact analysis might also evaluate changes in demand for housing and public services, such as health, educational and law enforcement services.

Socioeconomic impact assessments using modeling tools require specific types of data. For example, an economic assessment of a proposed action involving the construction and operation of a new manufacturing facility would involve evaluating economic impacts for both the construction and operation phases of the facility's life cycle. Data needed to run the economic model would include information on the manufacturing plant's employment and payroll levels, duration of the construction and operational phases, and information on the industrial classification of the production facility (i.e., NAICS code). The economic model would then provide an estimate of the total number of jobs generated by the new plant, including those indirectly generated. Total changes in regional personal income and other economic indicators would also be generated to develop a detailed assessment of the impact of the plant on the regional economy.

The above example is provided to help explain the difficulty of quantifying the potential economic impacts of the proposed alternatives assessed for the current analysis. Whereas the establishment of a new manufacturing facility can be directly linked to specific types and numbers of new jobs, this interim protected species management plan/EA involves no direct linkage to regional employment or income. The proposed action would, for example, involve no new construction or the hiring of workers, either in the public or private sector. It would have no effect on tax policy nor would it involve regulatory changes to how businesses operate. In short, the proposed action is not directly linked to regional economic activity. The proposed action could nonetheless affect future regional economic output indirectly through induced changes in visitation levels to the Cape Lookout National Seashore and surrounding areas. Specifically, depending how future prospective visitors would respond to the proposed changes in vehicle accessibility to portions of the seashore, businesses that depend on tourist revenue could be affected, which in turn, could impact the regional economy. Fewer visitors to the region would result in less consumer spending and ultimately reduced business volume. If the reduction in spending were to be sufficiently large, some businesses might reduce their number of employees, leading to an overall lessening of economic activity in the region.

However, unlike example of a proposed factory, there are no data available to enter into an economic model to estimate employment and income changes. Specifically, there is insufficient information to accurately predict the future behavior of prospective visitors in response to each proposed alternative and the subsequent impact on businesses that would be patronized by these visitors. To quantify the economic changes of the proposed actions one would need to accurately estimate changes in visitation levels for both day visitors and overnight visitors, as well as for local and out-of-region visitors. One would also

need to obtain data on the spending patterns for each of these visitor categories to determine how they allocate their spending among the different types of businesses (e.g., lodging, retail stores, and restaurants) in the region to estimate the “multiplier effect” of the future spending changes. These types of information are usually obtained through a detailed survey of visitor attitudes, which is a costly and time consuming process and which is beyond the scope of the current assessment.

Because of these data limitations, the approach used for the current economic assessment is a qualitative one, although one that is supported by data on visitor use and concessionaire receipts within the region of influence and additional information provided by selected businesses during informational telephone interviews. The following sections describe the categories of impact thresholds used for the economic analysis, a discussion of the information used to determine the impact levels for past closures, and a description of the expected impacts for each proposed alternative action.

STUDY AREA

The socioeconomic environment evaluated encompasses one county in coastal North Carolina—Carteret County. This county forms the economic region of influence (ROI) and defines the geographic area in which the predominant social and economic impacts from proposed action are likely to take place. The geographical area of the ROI is defined based on the locations where the proposed restrictions on recreational activities (as part of the interim protected species management plan/EA) would be implemented and the distribution of the businesses that would most likely be affected by those restrictions. The study acknowledges that the socioeconomic effects from the proposed and alternative actions could extend beyond the ROI, although these impacts would be substantially diminished beyond the directly affected areas.

ECONOMIC IMPACTS OF THE PREVIOUS CLOSURES

As noted above, the economic impact of the proposed alternatives would depend on how prospective visitors would respond to future restrictions on vehicle access to portions of the seashore. This is particularly true of those Cape Lookout National Seashore visitors who travel to the region to participate in recreational fishing and who use ORVs to access fishing areas. The impact of the proposed alternatives would depend on the response of this segment of the visitor population to future vehicle restrictions.

No surveys on visitor attitudes toward previous or proposed beach closures have been conducted for Cape Lookout National Seashore. Efforts are underway to conduct a Visitor Use Study that would include a survey and provide an estimate on the percentage of visitors that participate in recreational fishing and use ORVs for access. In addition, the public comments received during the scoping process provided no strong indication of opposition from ORV users to the proposed alternatives. This lack of information makes it difficult to project the economic consequences of implementing any of the alternatives.

One alternative to using visitor surveys as a predictor of future economic impacts of the proposed vehicle restrictions is to evaluate the economic impact of past vehicle restrictions at the individual business level or the ROI level. During the past decade, the NPS has imposed vehicle restrictions on a consistent basis in support of species management at Cape Lookout National Seashore, which might have affected area businesses that primarily serve seashore visitors. Such impacts, if large enough, could have reverberated through the ROI economy. A limitation to this approach, however, is that visitor expenditures at Cape Lookout National Seashore for any particular period could be influenced by other factors, independent of NPS actions, including fuel prices, weather events, and overall regional and national economic conditions. In addition, it would be difficult to demonstrate that in the absence of these restrictions, the regional economic indicators, such as employment would have increased at the higher rate. Hence, conclusions drawn from this analysis should be viewed as qualitative.

CONCESSIONAIRE RECEIPTS

The most applicable information available to gauge the impacts of these restrictions on the regional economy is concessionaire receipts for the two cabin camp lodging and ferry operators serving the seashore. These are the only two concessionaires operating within the seashore, although several other “passenger only” ferry services provide additional access to the seashore. The primary clientele of the concessionaires are recreational anglers. Broader economic indicators, such as lodging / occupancy gross sales receipts collected at the county level, were not considered since seashore visitors and recreational anglers tend to bypass most mainland establishments due to the seashore’s remoteness, ferry or boat only accessibility, and on-site cabin and backcountry camping opportunities.

The two concessionaires’ gross sales by month and year for the period from 2000 to 2005 are presented in table 30. It is important to note that the concessionaires are closed from early December to March or April depending on the concessionaire and year. During 2003, the concessionaires were forced to close earlier than normal because of Hurricane Isabel. As shown in the table annual revenues were significantly reduced at both locations. As noted above, the concessionaires’ main clientele are anglers who tend to use the services primarily during the peak fishing months when the cooler water attracts the larger game fish. Table 30 reflects this with peak sales occurring in these spring and fall months, and a drop in sales occurring during the summer months.

The gross sales data provide little indication of potential closure impacts. The overall revenue trend was positive for the period of 2000 through 2005, with 2003 levels being significantly depressed because of the effects of Hurricane Isabel. Nonetheless, the overall growth in revenue has been sluggish. The 2004 revenues from cabin and ferry services at Great Island remained significantly below 2002 levels.

It is not clear how species management has affected these businesses. The most restrictive of closures generally occurred from mid-June to mid-August at the New Drum Inlet and Cape Lookout Point. These closures do not occur during the spring or fall fishing seasons. Any adverse effects due to winter closures are not reflected in the concessionaire data, for they are not open during the winter months.

A second aspect of evaluating the potential economic impacts of the proposed action is to determine the importance of the affected businesses to the overall regional economy. That is if the businesses serving the seashore were adversely affected, what would the impact be on the regional economy? Overall, the linkage between expenditures by ORV participants at Cape Lookout National Seashore and the health of the ROI economic would appear to be minor. The large majority of hotel receipts related to recreation and tourism in the ROI are generated by persons visiting the county’s Crystal Coast area—Atlantic Beach, Beaufort, Down East communities, Emerald Isle, Indian Beach, Morehead City, and Pine Knoll Shores. By comparison the annual revenue generated by the businesses serving Cape Lookout National Seashore is quite small. For example, in 2002, Carteret County visitor expenditures totaled \$212 million, and the county ranked 10th in visitor expenditures out of fifteen comparable beach destinations. Of this total, the two concessionaires at Cape Lookout National Seashore recorded gross sales of just over \$1.2 million or about 0.5 percent. Though other businesses also provide ferry service to the seashore, the sum of their total sales is also likely to be minimal when compared to the overall visitor expenditures in the county. Similarly, some visitors to the seashore stay on the mainland and generate revenue for hotels, restaurants, and other retail services within the ROI. However, this segment of the tourist population is less likely to be affected by the temporary closures than the “stay over” visitors who are primarily recreational anglers needing access to the beach.

TABLE 30: CONCESSIONAIRE GROSS SALES BY MONTH AND YEAR

	Long Point, North Core Banks: Morris Marina Kabin Kamps & Ferry Service, Inc.					
	2000	2001	2002	2003	2004	2005
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	\$6,970	-	\$11,009	-	-	\$14,630
April	\$20,954	\$42,234	\$46,108	\$36,717	\$38,409	\$53,481
May	\$71,525	\$48,439	\$58,721	\$53,671	\$57,136	\$86,448
June	\$37,414	\$36,083	\$39,334	\$39,639	\$60,012	\$55,605
July	\$32,954	\$46,503	\$41,249	\$39,820	\$37,497	-
August	\$23,220	\$12,307	\$33,386	\$33,386	\$30,348	\$24,439
September	\$52,390	\$45,454	\$61,795	-	\$54,447	\$42,842
October	\$102,175	\$124,457	\$96,688	-	\$117,024	\$128,008
November	\$114,796	\$68,995	\$52,423	-	\$83,967	-
December	\$2,639	\$4,074	\$13,545	-	-	-
Total	\$465,039	\$428,546	\$454,257	\$203,233	\$478,840	\$405,453
	Great Island, South Core Banks: Great Island Cabins & Ferry Service, Inc.					
	2000	2001	2002	2003	2004	2005
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	\$3,314	-	\$9,762	\$8,153	-	-
April	\$53,588	\$66,138	\$69,690	\$66,674	\$62,247	-
May	\$76,717	\$76,610	\$80,611	\$91,843	\$75,985	\$33,299
June	\$57,724	\$61,268	\$73,420	\$69,801	\$62,724	\$78,107
July	\$49,721	\$47,262	\$50,498	\$49,887	\$54,671	\$52,686
August	\$26,226	\$31,008	\$27,620	\$38,150	\$34,655	\$37,450
September	\$80,572	\$94,796	\$99,148	-	\$69,738	\$62,347
October	\$160,174	\$173,771	\$180,661	-	\$154,169	-
November	\$110,915	\$128,200	\$144,877	-	\$121,843	-
December	\$20,253	\$18,078	\$22,574	-	-	-
Total	\$639,204	\$697,130	\$758,861	\$324,508	\$636,033	\$263,890

Wouter Ketel and Lynn Winstead 2005 pers. comm.

INFORMATIONAL INTERVIEWS

During the third week of December 2005, all ten of the ferry services providers were contacted by telephone to obtain general impressions of how past closures affected their business. A total of three businesses provided responses—several of the businesses were likely closed for the season and none of the responding businesses provides service to the North Core Banks. Of those that responded, none estimated economic losses from past closures. In contrast, all three asserted that they knew or had heard little, if anything, about closures. The owners were also uncertain whether new or additional closures would affect their businesses. Although three interviews are insufficient in themselves to draw any definitive conclusions, it is worth noting that they are consistent with the findings described above.

SUMMARY OF DATA FINDINGS

Together the concessionaire sales data and the informational telephone interviews, along with the economic data presented in the “Affected Environment” chapter provide a generalized picture on the status of the regional economy over the past decade. As described in the “Affected Environment” chapter, the regional economy has experienced robust population and economic growth over the past decade, including a substantial increase in tourism, with tourism-related jobs accounting for 10 percent the county’s employment. This regional growth has taken place concurrent with NPS restrictions on vehicle access to beaches within the seashore.

The concessionaire receipt data and the informational interviews provide some additional insight as to how the beach closures might have affected the regional economy and its recreational component. There is no indication that past closures have adversely affected businesses serving Cape Lookout National Seashore or the ROI economy. Although overall revenue growth of the major concessionaires has been sluggish during the past 5 years, other factors, including high fuel prices and major weather events may have been a factor. The most restrictive of closures generally occurred from mid-June to mid-August and not during peak spring and fall fishing seasons. However, visitor use at the seashore peaks during these summer months with an increase in the percentage of families visiting the seashore and a decrease in recreational anglers. Furthermore, anglers at Cape Lookout National Seashore tend to fish the entire shore, thereby, avoiding any closures and still being able to fish. Of those who responded to the informational interviews, none estimated economic losses from past closures. The owners were also uncertain whether new or additional closures would affect their businesses. Finally, the data indicate that revenues generated by businesses serving Cape Lookout National Seashore are quite small compared to the revenues generated by the rest of the ROI’s tourist sector. Therefore, even if the seashore concessionaires were adversely affected, the impact to the regional economy would be negligible.

IMPACT THRESHOLDS

Four potential category impact levels were defined for the purposes of the economic analysis:

<i>Negligible:</i>	No impacts would occur or the impacts on socioeconomic conditions would be below the level of detection.
<i>Minor:</i>	The impacts on socioeconomic conditions would be small, but detectable and localized. In particular, a business within a town or village within the region could be affected in a perceptible way, but no impacts would be perceptible at the regional level. Local impacts would be limited.

<i>Moderate:</i>	The impacts on socioeconomic conditions would be readily apparent at the localized level. Any impacts would result in changes to socioeconomic conditions on a local scale and could include changes to the operation and/or profitability of local businesses. Impacts at the regional level would be minor.
<i>Major:</i>	The impacts on socioeconomic conditions would be readily apparent. Impacts would cause substantial changes to socioeconomic conditions in the region of influence, including potential large-scale changes to the operation and/or profitability of multiple businesses.
<i>Duration:</i>	Short-term impacts would occur sporadically throughout a year, but would generally last between no more than three weeks per year. Long-term impacts would occur more than three weeks per year, and could continue beyond the life of the interim protected species management plan/EA, depending on the outcome of the long-term ORV management plan/EIS.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Alternative A would involve the continuation of current management practices. Based on the information discussed in the previous section, the current management practices would have no adverse impact on service sector businesses in Carteret County. Continuation of the current species management practices would likely have a negligible to minor adverse impact on business volumes, for overall visitor use at the seashore has increased nearly every year for the past 10 years while management practices have remained consistent. The duration of impacts, if any, would likely be short-term. Overall, any impacts would likely remain localized and not affect local or regional economic growth. Any impacts would affect seashore concessionaires, ferry operators, and some tourist-related businesses close to the seashore.

Alternative A would provide continued ORV access throughout the seashore, except in the active nesting areas of piping plovers and in the nest relocation area for sea turtles. ORV would continue to be prohibited from driving on the beach at Shackleford Banks, between mile markers 41A and 41B, Power Squadron Spit, the interior of Cape Lookout Point and on Portsmouth Flats.

Nesting closures could expand and follow foraging plover chicks once they leave the nest resulting in full-beach closures to ORVs in some location on the North and South Core Banks. With a full closure, twice daily escort program could be implemented to provide access through Kathryn-Jane Flats and to the northern half of the North Core Banks and Portsmouth Village. In general, expanded closures would not impact the spring and fall fishing seasons, and ORVs and pedestrians would still have access to most of North and South Core Banks, minus buffer areas around nests. Impacts due to piping plover closures would likely be short-term and negligible to minor.

Similar to bird closures, ORVs and pedestrians would continue to have access around sea turtle nests when eggs are incubating. ORVs would be routed around the closure between the nest and dune line, or to the back road. As with the piping plover closures, ORVs and pedestrians would have access to most of the North and South Core Banks and peak fishing seasons would not likely be impacted. Because of the limited area associated with sea turtle and seabeach amaranth closures, impacts would be short-term and negligible.

Cumulative Impacts

Other past, current, and planned future activities within Cape Lookout National Seashore have the potential to impact the economy of the affected study area. In recent years, hurricanes, storms, and other events, and the subsequent recovery time required following these events, have adversely affected visitor

attendance resulting in some economic impact in the affected areas. At the regional level; however, these events have had little effect on overall economic growth during the past decade.

Actions at Cape Lookout National Seashore have been, and will continue to be, influenced by the concession and ferry operators serving the island. The level of services these operators provide would have an impact on the socioeconomics of the area, but the exact level of impact is unknown. The upcoming commercial services plan would have a long-term minor beneficial impact to socioeconomics as further opportunities for commercial services are explored.

The creation of a long-term ORV management plan/EIS both at Cape Lookout National Seashore and Cape Hatteras National Seashore has the potential to impact socioeconomics. Regulations related to ORV use at either seashore could encourage or discourage visitation at either park. Any major fluctuation in visitation at either park could impact the socioeconomic characteristics of the surrounding community. These impacts would be minor to moderate, depending on the location and extent of the impact. If regulations at these seashores resulted in a shift of visitation from one seashore to another, the possibility exists for beneficial impacts to one park and adverse to the other.

Overall, cumulative impacts would be long-term, minor adverse. When combined with the negligible to minor adverse impacts of alternative A, cumulative impacts would be minor adverse.

Conclusion

Implementation of alternative A would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, or some tourist-related businesses located in Carteret County, for overall visitor use at the seashore has increased nearly every year for the past 10 years while management practices have remained consistent. The duration of impacts, if any, would likely be short-term and occur on a yearly basis. Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse.

IMPACTS OF ALTERNATIVE B—INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Alternative B would be similar to alternative A, except that surveying of species would be increased weekly and buffer areas around bird nests, foraging chicks, and sea turtle nests would be increased. ORVs would be prohibited year round at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along the beach between mile markers 41A and 41B, and Power Squadron Spit; and from the first nest hatch to when the last chick has fledged or has been confirmed to be lost along the northern 2 miles of South Core Banks. All ORVs would be prohibited from Middle Core Banks and "Ophelia" Banks from April 1st to August 30th. In addition, the potential for ramp-to-ramp beach closures to protect foraging American oystercatchers chicks could further restrict ORV access. Back roads would continue to be considered, and an escort system would be possible in some circumstances such as busy weekends, or during holiday weeks. Additionally, camping prohibitions would occur near sea turtle nests and in areas where high concentrations of nesting American oystercatcher, and pets would be prohibited in the seashore.

This alternative would involve larger protective buffers and would prohibit driving in additional areas, while maintaining pedestrian access. Depending on the response of recreational anglers, campers, pet owners, and visitors using ORVs, this alternative could reduce future business volume for the concessionaires who cater to the recreational anglers and these other visitors.

A seashore employee would be stationed at ferry docks on a limited basis to relay education information about species management. Such outreach would lessen or eliminate potential concerns by providing

anglers and other visitors using ORVs and/or camping with information on the closures and options to avoid the closure areas. The most restrictive of closures would generally occur from mid-June to mid-August, and not during peak spring and fall fishing seasons. Spring fishing tournaments could be impacted by the April closure of Middle Core Banks and Ophelia Banks; however, these areas do not typically host tournaments. The closure of the northern end of South Core Banks would occur during the summer months and would not impact fishing tournaments. Therefore, alternative B would result in short-term, minor, adverse impacts to visitors participating in spring fishing tournaments.

Given the increase in public outreach and that the most restrictive of closures occur during non-peak fishing season, few visitors would likely turn away from visiting the seashore with the increased restrictions, and any resulting negligible to minor adverse economic impacts would likely remain localized and not affect regional economic growth. The duration of impacts, if any, would likely be long-term and last more than three weeks due to the five-month closure of the Middle Core and Ophelia Banks, four-month ban on pets, and potential restrictions on camping during American oystercatcher nesting.

Cumulative Impacts

Cumulative Impacts would be the same as for alternative A. Overall, cumulative impacts would be long-term, minor adverse. When combined with the negligible to minor adverse impacts of alternative B, cumulative impacts would be minor adverse.

Conclusion

Implementation of alternative B would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative were implemented. However, some anglers, pet owners, and campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of impacts, if any, would likely be long-term. Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts would be long-term, minor adverse.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIE MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Alternative C would provide protection to sensitive and listed species similar to alternative B with the addition of vehicle free zones and increased enforcement. Visitor outreach efforts would also be increased, providing a person at the vehicle ferry landings to inform the public of species management activities and related closures 7 days per week, allowing seashore staff to more proactively convey information with no gaps in service. Some areas would be closed from ramp-to-ramp to all recreation to protect American oystercatcher mating adults and chicks. Many other closure elements are similar to alternative B, with some increased buffer areas. An escort program would be implemented if the back road was not available during a ramp-to-ramp closure. Pets on leash would be permitted in this alternative and more strictly enforced, while campers could continue to be impacted by closure areas due to American oystercatchers. These measures would result in negligible to minor long-term adverse impacts.

This alternative would also involve larger closures than the continuation of current management practices and would prohibit driving in additional areas. Depending on the response of recreational anglers,

campers, and/or other visitors using ORVs to the additional closure activity and other species management actions, this alternative could also reduce future business volume for the concessionaires who cater to the recreational anglers and other visitors. However, the increased visitor outreach efforts that would take place at vehicle ferry landings would lessen or eliminate potential concerns by providing anglers and other seashore users with information on the closures and options to avoid the closure areas. Economic impacts would likely remain localized, affecting the concessionaires, ferry operators, and local tourist-related businesses in Carteret County, and would not affect the regional economic growth. Impacts would be long-term minor adverse.

Cumulative Impacts

Cumulative Impacts would be the same as for alternative A. Overall, cumulative impacts would be long-term, minor adverse. When combined with the negligible to minor adverse impacts of alternative C, cumulative impacts would be minor adverse.

Conclusion

Implementation of alternative C would likely have a negligible to minor adverse affect on seashore concessionaires, ferry operators, and local tourist-related businesses located in Carteret County. Overall visitor use at the seashore has increased nearly every year for the past 10 years, and with this alternative's increased outreach, it is likely that few visitors would stop coming to the seashore or limit their time in the area if this alternative were implemented. However, some anglers and campers may be among those who stop visiting due to the restrictions the alternative places on them, and this would likely result in a minor impact on the businesses listed above. The duration of any impacts would likely be long-term. Regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches. Cumulative impacts under alternative C would be long-term minor and adverse.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Analysis

As described in the other alternatives, multiple areas would be permanently and seasonally closed to protect mating and nest shorebirds, including the active nesting areas for plovers; areas permanently closed to ORVs such as Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along the beach between mile markers 41A and 41B, and Power Squadron Spit; and, Middle Core Banks, Ophelia Banks, and the northern end of South Core Banks. Although ORV access is generally provided around these areas via the back road or an escort system, these closures serve to restrict some beach access for ORV use. In addition to these closures, all of Cape Lookout Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and the historical nesting areas of terns and skimmers would be closed on April 1st and expanded as necessary resulting in long-term, moderate, adverse impacts to ORV users and anglers because of reduced beach access similar to alternatives B and C. In addition, ramp-to-ramp full-beach closures to protect mobile American oystercatcher chicks could also occur, although, similar to other alternatives, ORV access would be provided via the back road or through the closure area at reduced speeds or with an escort system.

Protection of sea turtle nests and seabeach amaranth would be the same as alternatives A and C, respectively, resulting in short-term, minor adverse impacts to visitors. In addition, visitors displaced from closures areas would also cause short-term, minor, adverse impacts to other visitors as described in alternative A.

Overall, implementation of alternative D would likely lean the most toward having a minor adverse affect on seashore concessionaires, ferry operators, and tourist-related businesses in Carteret County due to the potential loss of some visitors. This alternative has the potential to turn away anglers, campers, and other seashore users due to the limitations in access and overall shoreline availability for their use. The duration of any impacts would likely be long-term. As with all of the other alternatives, regional impacts would likely be negligible due to the overall economy's reliance on tourist spending not linked to ORV and pedestrian accessibility to Cape Lookout National Seashore beaches.

Cumulative Impacts

Cumulative Impacts would be the same as for alternative A. Overall, cumulative impacts would be long-term, minor adverse. When combined with the negligible to minor adverse impacts of alternative D, cumulative impacts would be minor adverse.

Conclusion

This alternative incorporates species management measures from all of the other alternatives and provides ORV and pedestrian access. However, additional closures would encompass all of Cape Lookout Point, historic and potential new piping plover habitat, active colonial waterbird active nesting areas, and historical nesting areas of terns and skimmers. These combined restrictions would result in the most reduced seashore-wide beach access of all the alternatives, and ORV users and anglers would be most impacted due to the limited access to spits and potentially long expanses of oceanfront.

SEASHORE MANAGEMENT AND OPERATIONS

Seashore management and operations refers to the current staff available to adequately protect and preserve vital seashore resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct seashore operations.

GUIDING REGULATIONS AND POLICIES

Direction for management and operations at Cape Lookout National Seashore is set forth in the seashore's enabling legislation, *General Management Plan and Amendment to the General Management Plan* (NPS 2001b), *Strategic Plan* (NPS 2000b), and the *Superintendent's Compendium* (NPS 2003a). Specifically related to the interim protected species management plan/EA, the 2001 *Amendment to the General Management Plan* identified the impact of visitors and visitor service infrastructure and effects of proposed changes on seashore staff and resources as two issues that needed to be addressed. Specific management objectives included that would be applicable to seashore operations and maintenance and species protection include the construction of 40 new cabins and the development of a long-term ORV management plan/EIS.

The *Strategic Plan* (2000b) identified the following goals in relation to the interim protected species management plan/EA. Although the strategic plan/EA covers the five-year period from 2000 to 2005, these are still applicable to the interim protected species management plan/EA.

- Natural and cultural resources and associated values are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context.
- The seashore contributes to knowledge about natural and cultural resources and associated values; management decisions about resources and visitors are based on adequate and scholarly and scientific information.
- Natural and cultural resources are conserved through formal partnership programs.
- The seashore uses current management practices, systems, and technologies to accomplish its mission.
- The seashore increases its managerial capabilities through initiatives and support from other agencies, organizations, and individuals.

The *Superintendent's Compendium* (NPS 2003a) sets forth the closure and public use limits that the seashore staff are required to enforce, thus determining levels of seashore operations.

METHODOLOGY AND ASSUMPTIONS

Seashore management and operations, for the purpose of this analysis, refers to the quality and effectiveness of seashore staff to maintain and administer seashore resources and provide for an effective visitor experience. This includes an analysis of the projected need for staff time and materials in relation to protected species management under each of the alternatives, as well as the various funding mechanisms available to implement these alternatives. The analysis also considers trade-offs for staff time or budgetary needs to accomplish the proposed alternatives and discusses each alternative in terms of its impacts on the Interpretation, Resource Management (specifically natural resources management), and Law Enforcement Divisions. Members of the planning team included seashore staff from each division that were consulted regarding expected staff and funding needs under each alternative. The impact analysis is based on the current description of seashore operations presented in the "Affected Environment" chapter of this document.

STUDY AREA

The study area for operations and maintenance considered all components of Cape Lookout National Seashore. All areas of the seashore were considered because staff must cover all of these areas, regardless of the protected species management programs occurring.

IMPACT THRESHOLDS

Impact thresholds that measure the change in the amount of seashore staff and other as a result of each alternative are as follows:

<i>Negligible:</i>	Seashore or agency operations would not be impacted or the impact would not have a noticeable or measurable impact on seashore or agency operations.
<i>Minor:</i>	Impacts would be noticeable and would result in a measurable, but small, change in seashore or agency operations. Any required changes in seashore staffing and funding could be accommodated within normal budget cycles and expected annual funding without appreciably affecting other operations within the seashore.
<i>Moderate:</i>	Impacts would be readily apparent and would result in a substantial change in seashore or agency operations that would be noticeable to staff and the public. Required changes in seashore staffing and/or funding could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels between operational divisions.
<i>Major:</i>	Impacts would be readily apparent and would result in a substantial change in seashore operations that would be noticeable to staff and the public and would be markedly different from existing operations. These changes in seashore staffing and/or funding could not be accommodated by expected annual funding and would require the seashore to readdress its ability to sustain current seashore operations.

IMPACTS OF ALTERNATIVE A: NO-ACTION, CONTINUATION OF CURRENT MANAGEMENT

Analysis

Under alternative A, resource management activities between the three divisions would continue as currently conducted. Staffing levels would experience little change from current levels. The cost of staff time and materials dedicated to protected species management programs, approximately \$478,313, would remain relatively constant and would only increase in relation to staff salary increases and inflation.

Interpretation. Interpretation staff available for species protection activities under alternative A includes the Chief Ranger, 2 full-time interpreters, 2 seasonal interpreters, 1 park guide and 1 6-month Student Conservation Association intern conducting outreach activities for the seashore. Outreach would be performed concurrently with other duties in the field. Under alternative A, interpretation staff would continue to provide protected species informational materials, including brochures at the visitor center on the seashore's endangered species; signage, site bulletins, and interpretive programs; press releases notifying the public of non-routine closures that affect ORV access; and the seashore's website with up-to-date closure information. Current interpretation staff may not be adequate to fulfill existing natural resource management needs. These ongoing demands on interpretation staff would be expected to be noticeable and result in a measurable, but small, change in seashore operations, resulting in short- and long-term minor adverse impacts. In times where additional activities are required (i.e., implementation of

an escort program or storm recovery), current interpretation staff may be redirected from routine activities to other activities. Any required changes in seashore staffing and/or funding could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels between operational divisions and, thus, resulting in moderate, long-term adverse impacts on seashore management and operations.

Resource Management. Resource management staff available for species protection activities under alternative A includes the Chief Ranger, one full-time biologist, one seasonal employee, and two 12-week Student Conservation Association interns conducting surveying and management activities for the seashore. Under alternative A, resource management staff would continue to be responsible for surveying all protected and special concern bird species throughout the species lifecycle (pre-nesting through fledge) as well as surveying for the piping plover during wintering and migration. Pre-nesting surveys would begin between late-March and late-April, dependent on the species being surveyed. Based on this surveying, management activities would include closing active breeding areas for piping plover and colonial waterbirds to recreational use, locating nests, adjusting buffer sizes as necessary, recording nest locations and bird behaviors, and removing closures when applicable. Resource management staff would also be responsible for surveying for sea turtle nests beginning June 1 through August 15. Turtle management would include locating false crawls, establishing closures around nests, relocating nests if they are in danger of frequent flooding, and excavating nests and data collection after the nest hatch date. Resource management staff would conduct an annual survey for seabeach amaranth in late-July or early-August.

Alternative A would continue to require a portion or all of the time of two full-time employees and three seasonal employees. The annual cost of staff time and other materials (stakes, signs, etc.) to the Resource Management Division would be approximately \$155,500. Staff would continue to survey for and manage for these species under existing staffing and funding levels which would result in short- and long-term minor adverse impacts. In times where additional activities are required (i.e., implementation of an escort program or severe weather events/recovery), staff would not be available for regular resource management activities. Any required changes in seashore staffing and/or funding could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff from species survey activities to implementation of an escort program, for example; resulting in moderate, long-term adverse impacts on seashore management and operations.

Law Enforcement. Field law enforcement staff available for species protection activities and monitoring compliance with species protection measures under alternative A includes one supervisor, one field ranger, and two 6-month seasonal rangers, which together provide compliance monitoring up to 2 to 3 days per week at North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Species protection is performed concurrently with other duties in the field. Actual coverage is likely to be substantially lower than 2 to 3 days per week, per area, since law enforcement staff are subject to time consuming enforcement actions, local emergency responses, and mandatory long-term participation in national emergencies (e.g., hurricanes, homeland security, fire, etc.). Specific duties of law enforcement for protected species management would include restricting pedestrians from nest areas (pedestrians would be allowed in all other areas), and enforcing speed limits, pet restrictions, and other recreational restrictions (e.g., no fireworks). Because night enforcement is staff intensive and would heavily impact time available for day enforcement, regularly scheduled nighttime enforcement activities would not occur under alternative A.

The cost of staff time and materials, approximately \$246,725, would remain relatively constant and would only increase in relation to staff salary increases and the cost of inflation for supplies. At existing staffing levels, law enforcement staff would continue to not be available for all required protected species management needs, mainly providing compliance with existing species management closures. This would result in overall long-term moderate adverse impacts.

Cumulative Impacts

Storms and other weather events, including hurricanes, have impacted operations in the past as seashore staff in all three divisions were redirected from regular duties to storm recovery. These weather events can also alter habitat, resulting in additional responsibilities for resource management staff that have to identify and manage the new habitat if species start to use it. After staff respond to these events, normal duties resume. Storms and other weather events have had short-term moderate adverse impacts on seashore operations and maintenance.

Concessionaires and ferry operations have and would continue to influence the number of people accessing the seashore and the level of services required from seashore staff. The number of people accessing the seashore has steadily increased and is expected to continue to do so, requiring all seashore staff to devote more resources to protected species management to balance visitor needs and resource management. At current levels, the impacts of these activities would be long-term negligible adverse, but if emergency events occur that require seashore staff to be directed away from protected species management, the impacts could be short-term moderate to major adverse during the emergency period.

Future plans at the seashore that could impact seashore operations and maintenance include the Cape Lookout National Seashore long-term ORV management plan/EIS, the Commercial Services Plan, the Comprehensive Interpretive Plan, the Wayside Exhibit Plan, the Harkers Island and Cape Lookout Keepers' Quarters Exhibit Plan, and the stabilization of historic structures project. Each of these plans and projects would provide guidance to staff regarding regular duties. As a result of the long-term ORV management plan/EIS, staff could be required to provide additional services, such as informational programs and outreach, resource management, and enforcement. The additional requirements under the Comprehensive Interpretive Plan could also require each division to allocate resources differently or even require additional resources. Both exhibit plans could include protected species components, such as the development of displays for the Wayside Exhibit Plan, which would result in minor beneficial effects. The stabilization of historic structures project would occur during the interim plan and preparation for this project, including conducting an EA to analyze the impact of stabilization of historic structures, could use the same seashore staff needed for protected species management, resulting in short-term, minor, adverse impacts.

The combination of these past, current, and reasonably foreseeable future actions, when combined with the short- and long-term moderate impacts of alternative A, would be expected to have short-term moderate and long-term moderate, adverse, cumulative impacts.

Conclusion

Staffing levels and resources in all three divisions dedicated to protected species management activities would remain relatively constant. Existing staff would not always be able to meet protected species management needs resulting in long-term moderate adverse impacts on all divisions. Temporary actions such as implementation of an escort program and/or storm recovery operations would result in long-term, moderate, adverse impacts on all divisions. The implementation of protected species management programs for all three divisions would cost approximately \$478,313 under alternative A. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate impacts. The cumulative impacts under alternative A would be short-term moderate and long-term moderate adverse.

IMPACTS OF ALTERNATIVE B: INCREASED BUFFER ZONES AND INCREASED SURVEYING

Analysis

Under alternative B, resource management activities would include increased outreach using law enforcement staff at the ferry landings. This alternative would include more frequent surveying and additional ORV closures. Staffing levels would increase from current levels. The cost of staff time and

materials dedicated to protected species management programs would be approximately \$1,033,113 in the first year and \$830,113 annually in the following years.

Interpretation. Interpretation staff available for species protection activities under alternative B includes the Chief Ranger, two full-time interpreters, three seasonal interpreters, one park guide and one 6-month Student Conservation Association intern conducting outreach activities for the seashore. Outreach would be performed concurrently with other duties in the field. Under alternative B, interpretation related to resource management would be expanded. In addition to existing programs, the seashore would work with the North Carolina Maritime Museum and Cape Lookout Environmental Education Center to educate visitors about sea turtles and would increase visitor education regarding pet leash regulations. To conduct these activities, existing staff would be supplemented by one seasonal employee, whose duties would focus on disseminating information to the visiting public, resulting in an additional cost of \$22,000. Under alternative B, the total cost of interpretation staff time and materials devoted to protected species management would be \$98,088. The additional \$22,000 of funding required by the interpretation division would partially be accommodated through normal budget cycles and expected annual funding, but would not be fully covered by this source.

The increased costs, potential reallocation of staff, and the need for additional staff to address natural resource management needs would require changes in seashore staffing and/or funding that could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels, resulting in long- and short-term moderate adverse impacts on management and operation of the interpretation division. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current staff would be redirected from these activities. Staff would not be available for regular resource management activities, resulting in long-term moderate adverse impacts.

Resource Management. Under alternative B, surveying of protected bird species would be increased to 7 days per week for courtship, mating, and nesting activities for piping plover, Wilson's plover, and colonial waterbirds. Closures would occur and would include areas additional to those under alternative A. ORV closures would continue to be maintained at Shackleford Banks, Portsmouth Flats, the interior of Cape Lookout Point, along beach between mile markers 41A and 41B, and Power Squadron Spit. Additional full-recreational closures for piping plover and colonial waterbird nesting areas, as well as ramp to ramp closures for American oystercatcher, would require additional staff time to implement. Alternative B would also require additional surveying and management during wintering and migrating activities, in addition to existing levels.

To accommodate increased surveying and closures under alternative B, resource management staff available for species protection activities under alternative B would include the Chief Ranger, an upgrade in position for the existing staff biologist, one additional full-time biologist, one seasonal employee, and three 6-month Student Conservation Association interns conducting surveying and management activities for the seashore. Staff resources required to implement protected species management activities would increase by approximately \$189,500, for an annual total of \$345,000 in staff costs. A one-time cost of \$203,000 would also be required for additional cabin construction, and the purchase of 1 boat and 1 ATV.

Alternative B would require additional staff in the resource management division. Funding for these additional positions would partially be accommodated through normal budget cycles and expected annual funding, but would not be fully covered by this source. In addition to requiring additional funding, staff would be required to spend more time on protected species management activities, resulting in less time being spent on other existing programs.

The increased costs and potential reallocation of existing staff would require changes in seashore staffing and/or funding that could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels. Since many of these positions do not have a funding source, a substantial change in seashore operations would be required,

resulting in long- and short-term major impacts on the resource management division. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current resource management staff may be redirected from these activities to other activities. Staff would not be adequate and regular resource management activities could not be maintained with the available staff, resulting in long-term major adverse impacts.

Law Enforcement. Under alternative B, law enforcement efforts would include all the elements of alternative A with the addition of 2 law enforcement rangers stationed at the Long Point and Great Island ferry landings to provide outreach. The rangers would be responsible for contacting all ORV users entering the seashore 4 days out of 7 per week, 10 hours per day to relay information about species, closures, and pet leash regulations. Use of law enforcement staff in this outreach role would assist with compliance.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours, requiring one supervisor, one field ranger and two 6-month seasonal rangers, who, together, would monitor compliance up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island (see alternative A). Night monitoring would occur up to 4 nights per month throughout the seashore with the addition of one law enforcement ranger. The addition of the 2 rangers detailed above for outreach efforts would assist with compliance. Overall, enforcement of compliance would have beneficial impacts on piping plover and thus would affect/are not likely to adversely affect piping plover.

Under alternative B, the seashore would increase existing staff, resulting in an additional \$189,500 in costs. Approximate costs for law enforcement under alternative B would total \$387,025. Although there would be an increase in the number of law enforcement personnel, it would not provide the desired level of coverage, resulting in times with less coverage than currently occurs. Staffing night shifts would result in less daytime coverage and there could be a delayed response to closure violations due to lack of staff. Response to resource management violations may also be delayed, as life and death emergencies would take priority with the staff available.

Alternative B would require existing law enforcement staff to spend more time on protected species management activities, including nighttime patrols, resulting in less than desired coverage throughout the seashore during certain times of the day. The additional requirements would result in changes in seashore staffing that would not be accommodated within expected funding levels. The substantial change in seashore operations would be noticeable to staff and the public and would be markedly different from existing operations. These changes in seashore staffing would require the seashore to readdress its ability to sustain current seashore operations, resulting in short- and long-term major impacts under alternative B.

Cumulative Impacts

Past, current, and reasonably foreseeable future actions that have the potential for cumulative impacts under alternative B are the same as those described under alternative A. Demands on staff time would be influenced by long-term needs such as the creation and implementation of plans, as well as short-term needs such as response to storm and other hurricane events. Limited staff resources would be needed to address these actions.

The combination of these past, current, and reasonably foreseeable future actions, when combined with the short- and long-term moderate to major adverse impacts of alternative B are expected to have short-term moderate to major adverse and long-term moderate adverse cumulative impacts on seashore operations and maintenance, with potential short-term major impacts during emergency events.

Conclusion

Staffing levels and resources would increase for all three divisions. The total additional funding required under alternative B would be \$554,800 for the first year and \$351,800 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term moderate adverse impacts on the interpretation division and short- and long-term major adverse impacts on resource management and law enforcement. Temporary events such as the escort program and storms may result in long-term moderate to major adverse impacts on all divisions. Cumulative impacts would be short-term moderate to major adverse and long-term moderate adverse.

IMPACTS OF ALTERNATIVE C: ADAPTIVE SPECIES MANAGEMENT; INCREASED SURVEYING, ENFORCEMENT, AND EDUCATION

Analysis

Under alternative C, resource management activities would include increased outreach using law enforcement staff at the ferry landings every day of the week. This alternative would include more frequent surveying and additional ORV closures, similar to alternative B. Staffing levels would increase from current levels. The cost of staff time and materials dedicated to protected species management programs would be approximately \$1,291,913 in the first year and \$1,088,913 annually in the following years.

Interpretation. Interpretation staff available for species protection activities under alternative C includes the Chief Ranger, two full-time interpreters, five seasonal interpreters, one park guide and one 6-month Student Conservation Association intern conducting outreach activities for the seashore. Outreach would be performed concurrently with other duties in the field. Under alternative C, new and larger closure signs would be designed for birds and seabeach amaranth and daily morning vehicle closure information would be posted to a map at the ferry docks and to the seashore website. Like alternative B, the seashore would work with the North Carolina Maritime Museum and Cape Lookout Environmental Education Center to educate visitors about sea turtles and would increase visitor education regarding pet leash regulations. The additional cost related to adding two seasonal staff members would be \$44,000. Under alternative C the total cost of interpretation staff time and materials devoted to protected species management would be \$118,088.

Under alternative C, staffing levels in the interpretation division would increase, requiring an additional \$44,000 in funding annually. The additional funding may partially be accommodated through normal budget cycles and expected annual funding, but would not be fully covered by this source. In addition to requiring additional funding, existing staff would be required to spend more time on species management activities resulting in opportunity costs from the shifting staff time from one activity to another. Additionally, as stated under alternative A, current interpretation staff may not be available to address existing natural resource management needs.

The increased costs, diversion of existing staff from current projects to additional resource management projects, and the need for additional staff to address protected species management needs would require changes in seashore staffing and/or funding that could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels. Further, the requirement for two positions that do not have a funding source would require the seashore to readdress its ability to sustain current seashore interpretation operations resulting in long- and short-term major adverse impacts on management and operation of the interpretation division. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current interpretation staff may be redirected from these activities to other activities. Staff would not be adequate and regular resource management activities could not be maintained with the available staff, resulting in long-term major adverse impacts, depending on the frequency and duration of these events.

Resource Management. Resource management staff available for species protection activities under alternative C includes the Chief Ranger; upgrading the current biologist; and adding one full-time biologist, one seasonal employee, and three 6-month Student Conservation Association interns. Staff resources required to implement protected species management activities would increase by approximately \$189,500, for an annual total of \$345,000 in staff costs. A one-time cost of \$203,000 would also be required for additional cabin construction, and the purchase of 1 boat and 1 ATV.

Implementation of alternative C would require additional staff in the resource management division. Funding for additional positions may partially be accommodated through normal budget cycles and expected annual funding, but would not be fully covered by this source. In addition to requiring additional funding, existing staff would be required to spend more time on protected species management activities, resulting in less time being spent on existing programs.

The lack of a funding for additional staff and the potential reallocation of existing staff would require changes in seashore staffing and/or funding that could not be accommodated within expected annual funding and would measurably affect other operations within the seashore by shifting staff and funding levels. Since many of these positions do not have a funding source, a substantial change in seashore operations would be required, resulting in long- and short-term major impacts on management and operation of the resource management division. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current resource management staff may be redirected from these activities to other activities. Staff would not be adequate and regular resource management activities could not be maintained with the available staff, resulting in long-term major adverse impacts, depending on the frequency and duration of these events.

Law Enforcement. Under alternative C, outreach efforts would include all the elements of alternatives A and B but with the addition of 4 seasonal law enforcement rangers to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay information about species and closures. Use of law enforcement personnel in this role would assist with compliance.

Compliance with the established ORV and full recreational closures would be enforced during daytime hours up to 3 to 5 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island with the addition of 3 enforcement rangers. Nighttime enforcement would be the same as alternative B, occurring up to 4 nights per month throughout the seashore. This level of staffing would help mitigate impacts of emergency operations, and mandatory commitments to national emergency responses. Outreach staff at ferry arrival points and camps would also improve compliance, since visitors would know that enforcement staff are present on North Core Banks and South Core Banks.

Under alternative C, the additional law enforcement positions would require an additional \$377,100 annually. A one-time cost of \$38,000 would be required to purchase 2 ATVs and additional radios. Costs for law enforcement under alternative C would total \$661,825 in the first year and \$623,825 annually in subsequent years. Although there would be an increase in the number of law enforcement personnel, it would not be sufficient to provide complete and continuous coverage, including nighttime coverage, resulting in times with less coverage than currently occurring. Staffing night shifts may result in less coverage on day shifts and there could be a delayed response to closure violations due to lack of staff. Response to resource management violations may also be delayed, as life and death emergencies would take priority with the staff available.

Alternative C would require existing law enforcement staff to spend more time on protected species management activities, including nighttime coverage, resulting in less than desired coverage throughout the seashore. The additional law enforcement requirements would require changes in seashore staffing that could not be accommodated within expected annual funding, and these changes would be readily apparent resulting in a substantial change in seashore operations that would be noticeable to staff and the public and would be markedly different from existing operations. These changes in seashore staffing

would require the seashore to readdress its ability to sustain current seashore operations, resulting in short- and long-term major impacts under alternative C.

Cumulative Impacts

Past, current, and reasonably foreseeable future actions that have the potential for cumulative impacts under alternative C are the same as those described under alternative A. Demands on staff time would be influenced by long-term needs such as the creation and implementation of plans, as well as short-term needs such as response to storm and other hurricane events. Limited staff resources would be needed to address these actions.

The combination of these past, current, and reasonably foreseeable future actions, when combined with the short- and long-term major impacts of alternative C are expected to have short- and long-term moderate to major adverse cumulative impacts on seashore operations and maintenance.

Conclusion

Staffing levels and resources would increase for all three divisions. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The implementation of protected species management programs for all three divisions would cost an additional \$851,600 for the first year and \$610,600 for every subsequent year. This increase would not be accommodated by normal budget cycles and no other funding source exists to cover these increases. Due to the reprogramming of staff and additional funding required, there would be long- and short-term major adverse impacts on all divisions. Cumulative impacts would be short- and long-term moderate to major adverse.

IMPACTS OF ALTERNATIVE D: INCREASED SPECIES PROTECTION AREAS, EDUCATION, AND OUTREACH (PREFERRED ALTERNATIVE)

Under alternative D, protected species management activities would be implemented through adaptive management measures, with ramp-to-ramp closures and some increase in surveying activities. Education and outreach would be increased under alternative D.

Interpretation. Interpretation staff available for species protection activities under alternative D includes the Chief Ranger, two full-time interpreters, two seasonal interpreters, one park guide and one 6-month Student Conservation Association intern conducting outreach activities for the seashore. Under alternative D, outreach efforts would include all the elements of alternative A with the addition of interpretation staff to be stationed at Long Point and Great Island ferry landings 7 days per week, 10 hours per day to relay educational information about species and closures. Outreach would be performed concurrently with other duties in the field. These increased outreach activities would require 4 additional 6-month seasonal interpretation rangers to staff the education/entrance station, resulting in an additional \$80,000 cost.

The additional funding required for the interpretation division under this alternative may partially be accommodated through normal budget cycles and expected annual funding, but would not be fully covered by this source. Temporary funding from other sources, such as the Federal Lands Recreation Enhancement Act may occur under this alternative. Under this alternative, the entrance/education stations would be a visitor service and not a law enforcement function, and would be eligible for use of these funds. As stated under alternative A, current interpretation staff may not be adequate to fulfill existing natural resource management needs outside of the entrance/education stations, further placing demands on interpretation staff.

Funding sources outside the normal annual budgeting process would likely cover increased costs under alternative D. The diversion of existing staff from current projects to additional resource management

projects and the need for additional staff to address natural resource management needs would result in a measurable, but small, change in seashore or agency operations. Further, the addition of four interpretation positions to provide additional outreach and education at the entrance/education stations would result in beneficial effects on protected species management. In general, implementation of alternative D would have short- and long-term, minor beneficial and adverse impacts. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current interpretation staff may be redirected from these activities to other activities. Staff would not be adequate and regular resource management activities could not be maintained with the available staff, resulting in long-term moderate to major adverse impacts, depending on the frequency and duration of these events.

Resource Management. Resource management staff available for species protection activities under alternative D includes the Chief Ranger, one staff biologist, two seasonal employees, two 6-month Student Conservation Association interns, and two 12-week Student Conservation Association interns. Observations of hatchlings under alternative D would include 7 day per week surveying for piping plover and once every two days for colonial waterbirds and American oystercatcher. Surveying and management for Wilson's plover would occur in conjunction with the piping plover and when nests or scrapes are found outside of piping plover closures, these sites would be posted. Closures for American oystercatcher would occur from ramp to ramp if chicks are present on the beach. ORV traffic would be rerouted to the backroad on designated ramps. If there is no backroad, ORV traffic would be allowed with a lower speed limit and signs posted warning of chicks. Sea turtle patrolling would be the same as for alternative A. Seabeach amaranth would be surveyed and managed as described under alternative C.

To accommodate increased surveying under alternative D, the additional staff would require an additional \$67,500 for staff time and materials, including housing for Student Conservation Association interns.

Temporary funding sources outside the normal annual budgeting process, such as the Federal Lands Recreation Enhancement Act, would likely cover increased costs to the resource management under alternative D. Although additional staff would likely be funded, the existing staff would be diverted from current projects to address the additional surveying and management requirements under this alternative. This change in staff activities would result in impacts that would be readily apparent would affect other operations within the seashore by shifting staff and funding levels within the division, resulting in short- and long-term moderate adverse impacts. In times where additional activities are required (i.e., implementation of an escort program or storm recovery), current natural resource management staff may be redirected from these activities to other activities. Staff would not be adequate and regular resource management activities could not be maintained with the available staff, resulting in long-term moderate to major adverse impacts, depending on the frequency and duration of these events.

Law Enforcement. Compliance with the established ORV and full recreational closures would be enforced as detailed under alternative D, with compliance monitoring occurring up to 2 to 3 days per week on North Core Banks, South Core Banks, Shackleford Banks, and Middle Core Banks/Harkers Island. Night monitoring would not occur.

The use of interpretation personnel at the ferry entrance points to inform seashore visitors about the policies, closures, and other restrictions in effect 7 days per week at the Long Point and Great Island ferry landings for 10-hours a day would be expected to result in greater compliance and reduce the demands on law enforcement staff for enforcing resource closures.

Under alternative D, the seashore would not increase law enforcement staff and no additional funding beyond what is provided in alternative A would be required. At existing staffing levels, law enforcement staff would continue to not be available for protected species management needs, mainly providing compliance with existing species management closures. This would result in overall long-term moderate adverse impacts. However, increased education at all entrance stations would be expected to increase compliance and reduce demands on law enforcement staff. Impacts on seashore operations and maintenance would result in a change in seashore operations. The impact of this change would range from

small, but noticeable, to a substantial change and, depending on the impact of increased outreach, would result in short- and long-term, minor to moderate adverse impacts. During times when additional staff would be required (i.e., implementation of an escort program or storm recovery), current staff may be redirected from these activities to other activities. Staff would not be available and regular resource management activities by the law enforcement division would not be maintained, resulting in long-term moderate adverse impacts.

Cumulative Impacts

Past, current, and reasonably foreseeable future actions that have the potential for cumulative impacts under alternative D are the same as those described under alternative A. Demands on staff time would be influenced by long-term needs such as the creation and implementation of plans, as well as short-term needs such as response to storm and hurricane events. Already limited staff resources would be needed to address these efforts.

The combination of these past, current, and reasonably foreseeable future actions, when combined with the short- and long-term minor to moderate impacts of alternative D are expected to have short- and long-term moderate adverse cumulative impacts on seashore operations and maintenance.

Conclusion

Staffing levels and resources in the interpretation and resource management divisions would increase, while law enforcement staff would not increase. Temporary funding sources outside the normal budget cycle would be available to accommodate these increased staff levels. Even with more staff, existing staff would still be required to dedicate more of their time to protected species management activities, resulting in short- and long-term minor impacts on the interpretive division, short- and long-term moderate adverse impacts on the resource management division, and short- and long-term minor to moderate adverse impacts on the law enforcement division. The implementation of protected species management programs for all three divisions would cost an additional \$147,500 under alternative D. Any unexpected resource protection needs or weather events may divert staff from other resource management activities and result in long-term moderate to major impacts, depending on the frequency and duration of the events. Cumulative impacts would be short- and long-term moderate adverse.

Consultation and Coordination

CONSULTATION AND COORDINATION

PUBLIC INVOLVEMENT

Park staff place a high priority on meeting the intent of public involvement in the National Environmental Policy Act (NEPA) process and giving the public an opportunity to comment on proposed actions. As part of the National Park Service (NPS) NEPA process, issues associated with the actions were identified during scoping meetings with NPS staff, coordination with other affected agencies including U.S. Fish and Wildlife Service, public meetings, and public comment.

During the development of an interim species management plan, the seashore will actively involve the public in the process. The seashore's goals for public participation include:

- Show people what NPS is doing with regard to ORV management and protected species management (the process and controls)
- Educate the public about the NEPA process and their opportunities for input
- Create strong public interest and constructive input
- Ensure all viewpoints are heard
- Have a good exchange of information
- Strive to have well attended public meetings and provide for a variety of ways for people to comment
- Eliminate misconceptions and the flow of misinformation
- Ensure the public knows how/where to access project information
- Encourage local media stories and increased interest
- Educate people about the project and parks' goals and how they can help
- Ensure people feel their input matters — that they are being heard
- Receive informative and objective media coverage on the project
- Satisfy all NEPA public involvement requirements
- Ensure that the region and NPS headquarters and Department of Interior view the process as a model for collaborative planning and public participation

The seashore places a high value on maintaining a meaningful dialogue with interested parties and organizations. The seashore elicited public participation in the discussion of issues, areas to be studied, and alternatives. Scoping and public involvement efforts included public meetings and open-house meetings, flyers and press releases, website postings, and dissemination of information and gathering of comments through the internet. Two public scoping meetings were held and are detailed below.

PUBLIC SCOPING MEETINGS

In early November 2005, two public scoping meetings were held to solicit public input, especially on issues and ideas for alternatives. Public participation is vital to the NPS NEPA planning process and

public scoping is an early and open process used to determine the scope of issues and alternatives to be addressed in the plan/EA. The goal of the meetings was to receive input from everyone, particularly on issues identified, concerns, and any ideas for alternatives that would meet the need, purpose, and objectives of this planning process.

The meetings were held on November 8 from 6:00 PM to 9:00 PM at the Duke Marine Lab in Beaufort, North Carolina, and on November 9 from 6:00 PM to 9:00 PM at the Core South Waterfowl Museum on Harkers Island, North Carolina. A total of 15 people attended the meeting in Beaufort, and 13 attended the meeting on Harkers Island.

To facilitate input, each meeting started with an open house, and was followed by a short presentation and second open house. During the open house portions of the meetings, the public was encouraged to interact with NPS staff and look at large displays that provided background on the plan and its alternatives. NPS staff recorded public comments on flip charts.

Notices for these meetings were posted on the NPS Cape Lookout National Seashore website and emailed, or mailed to citizens on the mailing lists, and press releases were sent to the following media/newspapers:

Headline News Local Edition

UNC Public TV

WFXI-TV 8

WITN-TV 7

WNCN

WNCT-TV 9

WCTI-TV 12

WNCR 41

WRAL

Asheville Press

Boone Mountain Times

Camp Lejune Globe

Chapel Hill Herald

Charlotte Observer

Cherry Point, The Windsock

Fayetteville Observer

Goldsboro News-Augus

Greenville Daily Reflector

Jacksonville Daily News

Kinston Free Press

Ocracoke Observer

Raleigh News and Observer
Tideland News
The Beaufort Gam
The Beaufort Venture
The Coastland Times
The Havelock News
The Pamlico News
The Sun Journal
The Washington Daily News
Wilmington Star News
Wilson Daily Times
Winston Salem Chronicle
Bogue Banks Branch Library
Carteret County Public Library
Cove City-Craven County Public Library
Emerald Isle Branch Library
Havelock-Craven County Public Library
New Bern-Craven County Public Library
Newport Public Library
North Carolina School of Government Library
Pamlico County Library
Vanceboro-Craven County Public Library

To keep the public involved and informed following the public scoping meetings, individuals were given the option to receive notification of the availability of the Interim Protected Species Management Plan/EA by either e-mail or mail and the option to either download a copy or have a hardcopy mailed. Individuals were also given the option not to be placed on the mailing list, and an option to keep their name and address private.

NPS provided a 30-day public comment period through which the public could participate by mail or on the Planning, Environment, and Public Comment (PEPC) website. NPS also posted information on the public scoping meetings and additional comment opportunities on November 9, 2005, with a December 9, 2005, deadline for comments.

The majority of comments focused on the alternatives, and more specifically, past and future NPS protected species management actions and ORV management actions. Over 75% of the comments received supported this draft plan/EA's no-action alternative, which reflects a desire for the continuation of current management practices. Comments that could be used for developing new alternatives related to both more and less robust species management and ORV restrictions.

PUBLIC INVOLVEMENT

It was explained that comments received should focus on the Interim Protected Species Management Plan/EA, but may also be applicable to the long-term ORV management plan/EIS that will be handled by a regulation development process. The opportunity for input into that process will be announced in coming months.

PUBLIC REVIEW OF DRAFT PLAN AND EA

This plan/EA will be distributed for a 30-day public review and comment period. The plan/EA will be made available for public review through PEPC, individual mailings, as requested, and hard copies of the document will be placed in local libraries.

IMPLEMENTATION OF PLAN

Following analysis and response to public comments on the plan/EA and any revisions needed to the plan, and conclusion of consultation with the U.S. Fish and Wildlife Service and other agencies regarding the plan, a decision will be made and the plan will be implemented in the spring of 2006.

OTHER CONSULTATION

Coordination and consultation efforts for this planning process focused on the means or processes to be used to include the public, major interest groups, and local public entities.

Coordination with local and federal agencies and various interest groups was conducted during the NEPA process to identify issues and/or concerns related to protected species management within the Cape Lookout National Seashore. Notice of the document will be posted on PEPC and the following organizations, agencies, and individuals will be notified of its availability.

CONGRESSIONAL DELEGATES

Elizabeth Dole, Senator

Richard Burr, Senator

Walter B. Jones, 3rd District Representative

STATE REPRESENTATIVES

Senator Scott Thomas, North Carolina General Assembly

Jean Preston, North Carolina General Assembly

FEDERAL AGENCIES

Bureau of Land Management

Federal Bureau of Investigation

Mattamuskeet National Wildlife Refuge

MCAS Cherry Point, Provost Marshall Military

National Marine Fisheries Service

National Oceanic and Atmospheric Administration

National Park Service, Cape Hatteras National Seashore

National Transportation Safety Board

U.S. Army Corps of Engineers

U.S. Coast Guard, Cape Hatteras

U.S. Customs

U.S. Fish and Wildlife, Ecological Services, Raleigh Field Office

U.S. Forest Service (Croatan)

U.S. Secret Service

STATE AND LOCAL GOVERNMENTS

Beaufort Airport

Beaufort Police Department

Carteret Community College

Carteret County Board of Commissioners

Carteret Planning Department

Fort Macon State Park

Morehead City Police Department

North Carolina Department of Natural Resources

- Division of Coastal Management
- Coastal Resources Commission
- Division of Marine Fisheries
- Division of Forest Resources
- Division of Water Resources
- Division of Water Quality
- Wildlife Resources Commission
- Wildlife Resources Commission, Law Enforcement
- North Carolina Natural Heritage Program

North Carolina Department of Transportation

North Carolina Division of Air Quality

North Carolina Division of Pollution Prevention and Environmental Assistance

North Carolina Division of Environmental Health

North Carolina Division of Soil and Water Conservation

North Carolina Highway Patrol, Morehead City

North Carolina Natural Heritage Program

North Carolina Office of the Governor

North Carolina Office of the Lt. Governor

North Carolina State Bureau of Investigations

North Carolina State Historic Preservation Officer

North Carolina State University NC Sea Grant

North Carolina Assistant US Attorney

Town of Atlantic Beach

Town of Beaufort

Town of Emerald Isle

Town of Indian Beach

Town of Morehead City

Town of Newport

Town of Pine Knoll Shores

University of North Carolina Institute of Marine Science

ORGANIZATIONS/OTHER

AB Kayaks

Albemarle-Pamlico National Estuary Program

Alger Willis Fishing Camps, Inc.

Anderson Maritime, Inc.

Barrier Island Kayaks

Bluewater Network

Calico Jacks Ferry

Cape Lookout Environment Education Center

Cape Lookout Mobile Sportsfishermen

Cape Lookout Studies Program

Cape Lookout Tours

Carolina Estuarine Reserve Foundation

Carolina Ocean Studies

Carteret County Animal Control

Carteret County Chamber of Commerce

Carteret County Economic Development Council

Carteret County Sheriff's Department

Center for Animals and Public Policy

Clean Water Management Trust Fund

Clemson University

Core Sound Kayaks and Touring Company

Core Sound Waterfowl Museum

Crystal Coast Canoe and Kayak Club

Crystal Coast Tourism Authority

Davis Island Fishing Foundation

Defenders of Wildlife

Downtown Morehead City Revitalization Association, Inc.
Duke University Nicholas School of the Environment and Earth Sciences Marine Laboratory
Equine Blood Typing Research Lab
Foundation for Shackleford Horses, Inc.
Friends of Cape Lookout
Good Fortune Sail Charters
Green Gar Guide Service
Green River Preserve
Harkers Island Fishing Center
Island Ferry Adventures
Law Offices of Leslie O. Wickhama, Jr.
Local Yokel Ferry and Tours
Lookout Cruises
Maxewell Bluck Equine Research Center
Morris and Marina, Kabin Kamps and Ferry Service, Inc
Mule Train Beach Tours
Mystery Tours
National Marine Manufacturers Association
National Parks Conservation Association
National Tails and Waters Coalition
New Hope Audubon Society
Noise Pollution Clearinghouse
North Carolina Aquarium at Pine Knoll Shores
North Carolina Audubon
Natural Resources Defense Council
North Carolina Coastal Federation
North Carolina Beach Buggy Association
North Carolina Coastal Federation
North Carolina Coastal Reserve
North Carolina Horse Council
North Carolina Maritime Museum

North Carolina Outward Bound School
North Carolina Shore and Beach Preservation
North Carolina State Vets
Outer Banks Ferry
Outer Banks Preservation Association
Outer Island Kayak Adventures
Personal Watercraft Industry Association
Princeton University Department of Ecology
Pro Canoe and Kayak
Portsmouth Island ATV Excursions
Rachel Carson Estuarine Reserve
Sierra Club, North Carolina Chapter
Sand Dollar Ferry
Save our State
Shackleford Banks Walking Tours
Star Route
The Nature Conservancy
The Ocean Conservancy
The Science and Conservation Center
The Wilderness Society
U.S. Humane Society
Waterfront Ferry Service

LIST OF PREPARERS

Name	Title	Education/ Responsibility	Experience
National Park Service staff from the Environmental Quality Division, Southeast Regional Office and Cape Lookout National Seashore contributed to this document.			
The Louis Berger Group, Inc.			
Gregory Dorn	Senior Planner/GIS Specialist	B.A. Environmental Science, M.S. Geography (emphasis in regional planning). Responsible for mapping and graphics.	7 years
Lori Gutman, AICP	Senior Planner	B.S. Natural Resources and Environmental Policy, M.C.P. Land Use, Environmental and Economic Development Planning. Responsible for park management and operations section.	6 years
Alan Karnovitz	Senior Economist	B.S. Natural Resource Science, M.P.P. Public Policy. Responsible for economics.	24 years
Karen Lusby	Senior Planner	B.A. Outdoor Recreation and Park Administration, M.S. Forest Economics. Responsible for visitor use and portions of cultural resource sections.	22 years
Dana Otto, AICP	Senior Environmental Scientist	B.S. Biological Sciences, M.S. Environmental Planning. Responsible for project management and review of all sections prepared by Louis Berger staff.	13 years
Richard Podolsky, PhD	Avian Species Specialist	B.A. Biological Conservation, M.S. Ecology, Ph.D Ecology, Fisheries, and Wildlife. Responsible for avian federal, state-listed, species of concern, and other avian species.	20 years
Spence Smith	Scientist	B.S. Zoology, M.A. Biology (concentration in marine biology). Responsible for soils and water quality.	9 years
Nancy Van Dyke	Senior Consultant	B.A. Biology and Geography, M.S. Environmental Sciences. Responsible for aquatic organisms, wildlife, special status species, general technical review	25 years
The Final Word			
Juanita Barboa	Lead Technical Editor	B.S. Technical Communication. Responsible for technical editing and publication management and coordination.	15 years

Glossary and References

GLOSSARY OF TERMS AND ACRONYMS

ACRONYMS AND ABBREVIATIONS

AMOY	American oystercatcher
ATV	all-terrain vehicle
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWB	colonial waterbird
dba	a-weighted decibels
EA	Environmental Assessment
MOSH	moist substrate habitat
mph	miles per hour
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
ORV	off-road vehicle
PIPL	piping plover
REKN	red knot
ROI	region of influence
SBA	seabeach amaranth
SCA	Student Conservation Association
U.S. EPA	U.S. Environmental Protection Agency
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WIPL	Wilson's plover

TERMS

Adults — An organism that is fully grown or developed and capable of sexual reproduction.

Affected Environment — The existing environment to be affected by a proposed action and alternatives.

“Allee effect” — Where populations continue to decline because the per capita birth rate declines at low densities because, for example, of the increased difficulty of finding a mate (Allee 1931).

Anthropogenic — Influence of human beings on nature.

Artificial lighting — Light sources produced by humans.

Benthic — The bottom, or relating to the bottom of the ocean or other body of water.

Bird Nesting — The act of building a structure by a bird for laying eggs and sheltering its young.

Breeding areas — Those areas that support the full suite of avian breeding activities including, courtship, territorial defense, copulation, scraping and nest building, egg laying and incubation, and chick rearing.

Breeding habitat — Habitat(s) that host the birds during territorial displaying, courtship and mating, scraping, nesting, incubation, brooding and chick foraging.

Brood — The offspring, as of an animal or a bird, that are the result of one breeding season.

Buffer — An area surrounding a sensitive resource limiting visitor access.

Closure — An area delineated by posts with string between them, prohibiting vehicle and/or pedestrian access (except in alternative A, where sometimes string is not used between posts).

Council on Environmental Quality (CEQ) — Established by Congress within the Executive Office of the President with passage of the *National Environmental Policy Act of 1969*. CEQ coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

Crawl — Tracks and other signs left on a beach by a sea turtle (FWC 2005).

Cumulative Impacts — Under NEPA regulations, the incremental environmental impact or effect of an action together with the effects of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7).

Decapods — Invertebrate animals of the order Crustacea, which have five pairs of legs and includes the shrimps, lobsters, crabs, etc.

Dune — A mound or ridge of sand or other loose sediment formed by the wind along a the sea coast.

Enabling Legislation — National Park Service legislation setting forth the legal parameters by which each park may operate.

Endangered Species — "...any species (including subspecies or qualifying distinct population segment) that is in danger of extinction throughout all or a significant portion of its range (ESA Section 3(6))." The lead federal agency, U.S. Fish and Wildlife Service, for the listing of a species as endangered is responsible for reviewing the status of the species on a five-year basis.

Endangered Species Act (ESA) (16 USC 1531 et seq.) — An Act to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to provide a program for the conservation of such endangered species and threatened species.

Environmental Assessment (EA) — An environmental analysis prepared pursuant to the *National Environmental Policy Act* to determine whether a Federal action would significantly affect the environment and thus require a more detailed environmental impact statement (EIS).

Executive Order — Official proclamation issued by the President that may set forth policy or direction or establish specific duties in connection with the execution of federal laws and programs.

False crawl — An aborted nesting attempt (emergence onto a beach by a sea turtle). A more correct term is “non-nesting emergence” (FWC 2005).

Fledge — The stage in a chick’s life when the feathers and wing muscles are sufficiently developed for flight. It also describes the act of raising chicks to a fully grown state by the chick’s parents.

Hatchlings — A young bird or turtle that has recently emerged from its egg.

Incidental take — Take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a federal agency or applicant [50 CFR §402.02].

Misorientation — Orientation in the wrong direction. For hatchling sea turtles on the beach, travel in any direction other than the general vicinity of the ocean (FWC 2005).

Mobile (precocial) — A young bird or turtle hatched or born in an advanced state of development and mobility and able to feed itself almost immediately.

Nesting crawl — A crawl resulting from a nesting attempt in which eggs were deposited (FWC 2005).

Nesting habitat — Habitat(s) that host the birds during nesting including incubation, brooding and chick foraging.

Nestlings — A bird that is too young to leave its nest.

Niche — A habitat supplying all of the necessary factors for a species existence.

Off-road vehicle (ORV) — Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that such term excludes (a) any registered motorboat, (b) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and (c) any vehicle whose use is contrary to restrictions proposed in this plan is expressly authorized by the Superintendent or the Refuge Manager under a permit, lease, license, or contract.

Overwash — Areas where water has run over or crested a berm or other structure that does not flow directly back to the ocean or lake.

Overwash fan — A fan-shaped deposit of sand, gravel or cobbles that is deposited from water that has run over or crested a berm or structure that does not flow directly back to the ocean or lake.

Potential new habitat — Habitat recently created, usually by storms, e.g., overwash passes, blowouts, etc.

Scarified — To break a seed coat through nicking or abrasion.

Scrapes — A place where soil has been scraped away, esp. a shallow hollow formed in the ground by a bird during a courtship display or for nesting.

Symbolic fencing — Posts with string tied between them.

Take — An act that potentially harasses, injures, or kills a protected species (FWC 2005). Take is defined differently depending on the governing legislation (i.e., Endangered Species Act, Migratory Bird Treaty Act).

“Take” as it applies to the Migratory Bird Treaty Act and as stated in 50 CFR § 10.12, includes pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect. Executive Order 13186 which calls for an MOU that has not been completed by NPS or other land management agencies defines intentional and unintentional take.

“Take” as it applies to the Endangered Species Act and as stated in the Act § 3.19 means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harass is defined by Fish and Wildlife Service as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding feeding or sheltering. Harm is further defined by the U.S. Fish and Wildlife Service as “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering (50 CFR § 17.3).

Wrack line — Also known as a drift line, it is a line of stranded debris along a beach face marking the point of maximum run-up during a previous high tide.

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